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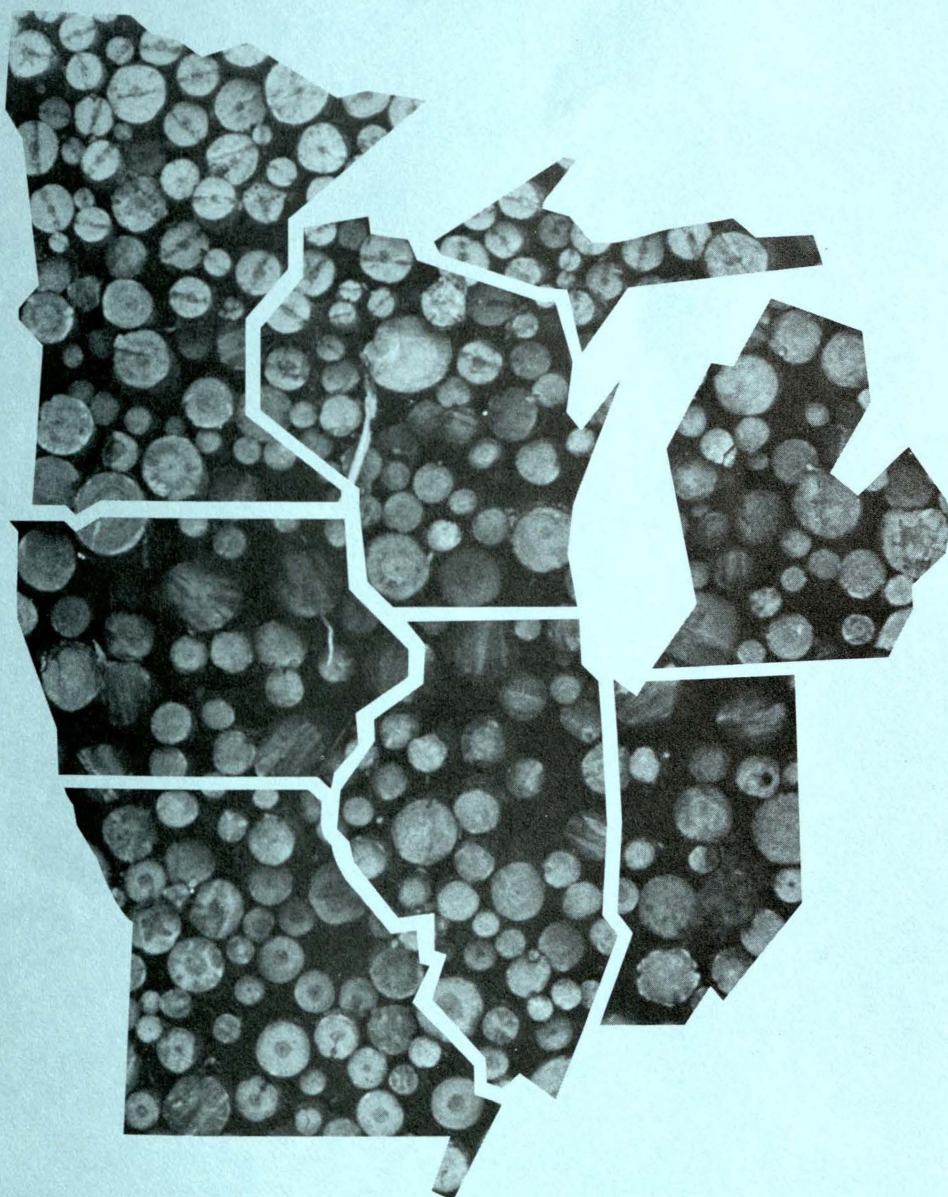
North Central
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Pulpwood Production In The North-Central Region, 1990

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HIGHLIGHTS

NOTE: This report includes all primary products made from reconstituted wood fiber. In addition to wood pulp, this includes particleboard products¹ made from chips, shavings, wafers, flakes, strands, and sawdust. This report presents the production by county of the raw fiber material delivered to mills. Thus, these data report only that portion of the timber harvest used as raw material and do not necessarily reflect the volume of growing stock harvested.

LAKE STATES

- Pulpwood production dropped to 8.4 million cords in 1990 from 8.5 million cords in 1989. Hardwoods constituted 76 percent of total pulpwood production. Aspen remained the dominant hardwood species for roundwood harvested—64 percent of the total.
- Whole-tree chip production dropped to 518 thousand cords—an 18-percent decrease from 1989. Aspen also remained the dominant species for whole-tree chip production.
- Production of pulpwood for pulp mills increased 2 percent, while production for particleboard mills climbed 14 percent.
- Pulpwood production in Michigan increased 7 percent over 1988's record high. New highs in aspen, balsam fir, spruce, and white birch harvests were reached.
- Wisconsin pulpwood production expanded 3 percent, primarily in aspen.
- Minnesota pulpwood production increased 6 percent over last year. The 1990 softwood roundwood harvest in Minnesota was 11 percent higher than the previous year's harvest. The white birch harvest of 23 thousand cords was the highest since 1977.
- Softwood residue imports from Canada increased from 14 thousand cords in 1989 to 19 thousand cords in 1990. Wisconsin mills used 539 thousand cords and Michigan mills used 296 thousand cords from out-of-State producers.

CENTRAL STATES

- Pulpwood production in the Central States dropped 6 percent to 374 thousand cords.
- Hardwood residue from other wood-using plants comprised 74 percent of the total pulpwood production.
- Exports of pulpwood from the Central States decreased 8 percent from the previous year to 233 thousand cords.
- Central States producers shipped wood to mills in Kentucky, Wisconsin, Oklahoma, and Michigan.
- Indiana pulpwood production in the Central States was 189 thousand cords or 51 percent of total production.
- Receipts of pulpwood at Central States mills declined 2 percent to 141 thousand cords in 1990.

¹ U.S. Forest Products Laboratory. 1974. Wood handbook: wood as an engineering material. Agric. Handb. 72. (Revised). Washington, DC: U.S. Department of Agriculture, Forest Service: 23-27.

CONTENTS

	<i>Page</i>
Lake States	2
Production	2
Receipts	14
Industry Trends and Analysis.....	15
Central States	18
Production	18
Receipts	20
Industry Trends and Analysis.....	20
Appendix	20

Pulpwood Production In The North-Central Region, 1990

Ronald L. Hackett

Pulpwood constitutes more than half the industrial timber products harvested annually in the Lake States (Michigan, Minnesota, and Wisconsin) and is an important product in the Central States (Illinois, Indiana, Iowa, and Missouri).

Current detailed information about pulpwood production² is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, forest industry development, and scientific studies.

Since 1979, we have included logs, bolts, and wood residue used in manufacturing hardboard, flakeboard, waferboard, oriented strand board, and medium density fiberboard in this annual report. Together, these products are called particleboards, and all mills manufacturing these boards will be called particleboard mills in this paper. Wood used at particleboard mills is identical or nearly identical to wood used at pulp mills; therefore, including this wood in our study provides a more accurate estimate of demand for pulpwood-like material.

Particleboard mills were in their infancy before 1979 and used primarily aspen and wood residue. Therefore, data for these mills do not distort roundwood use trends for other species nor preclude comparing 1990 survey results with those of 1978 and previous years.

Pulp and particleboard mills using North Central States timber in 1990 reported their pulpwood receipts³ by species group and county of

origin. This report presents the results of the survey, analyzes the data, compares results with those of 1989 or earlier years, and discusses trends in pulpwood production and use.

The Lake States and Central States are discussed separately because the timber types in each area are different, the flow of wood between the areas is nominal, and more detailed data on pulpwood production and receipts in the Central States would reveal the operations of individual mills. This is the 32nd annual report of the pulpwood harvest in Lake States counties and the 31st annual report of the Central States harvest.

Several mills purchase their pulpwood based on weight rather than volume. Conversion factors used in the Lake States to convert green tons of pulpwood to standard cord equivalents are shown in the Appendix. Conversion factors used in the Central States are shown in footnote 1 of table 4.

Pulpwood production in Minnesota is completely and accurately shown. However, to prevent disclosure of confidential information about pulpwood use by individual companies, the total quantity of pulpwood imports and exports between Minnesota and Canada is not reported. Thus, some Minnesota softwood shipped to Canada is shown as remaining and used in Minnesota, and receipts of Canadian softwood in Minnesota may be understated.

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² Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut, plus the annual wood residue volume produced by sawmills, veneer mills, etc., used for pulp, particleboard, waferboard, oriented strand board, or medium density fiberboard.

³ Pulpwood receipts are the volume of wood received by mills in a specific State or region, regardless of the geographic source.

LAKE STATES

Production

Pulpwood production as a whole dropped by 1 percent from 8.5 million cords in 1989 to 8.4 million cords⁴ in 1990 (table 1). Of each cord produced, 93 percent came from roundwood (including chips from roundwood) and 7 percent came from residue⁵ from wood-using plants (fig. 1).

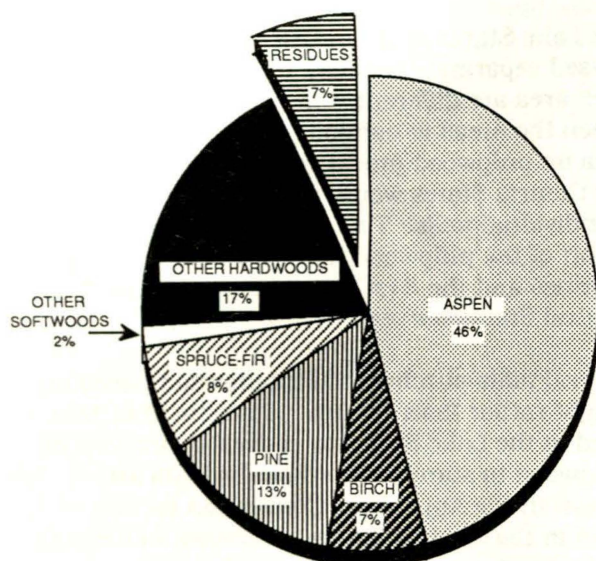


Figure 1.—Lake States pulpwood production by species group, 1990.

Principal species harvested were aspen (3.9 million cords), jack pine (647 thousand cords), hard maple (530 thousand cords), and white birch (494 thousand cords). Other major species furnishing more than 300 thousand cords were balsam fir, red pine, and soft maple.

⁴ All references to cords are in standard cords. A standard cord is 128 cubic feet of wood, bark, and air space.

⁵ Residue is the byproduct from sawmills, veneer mills, cooperage mills, and other wood-using mills that is used for pulping and particleboard. Residue includes slabs, edgings, veneer cores, sawdust, woodflour, and chips manufactured from slabs, edgings, and veneer cores.

Hardwoods constituted 76 percent of the total pulpwood production in 1990. Pulpwood from hardwood residue declined 47 thousand cords (10 percent) from 1989's 464 thousand cords. Aspen remained the dominant roundwood harvested—46 percent of the total. Jack pine (647 thousand cords), hard maple (530 thousand cords), soft maple (443 thousand cords), and balsam poplar (116 thousand cords) were at record production levels in 1990.

Softwood roundwood production in 1990 reached a new high of 1.83 million cords. Pulpwood production from softwood residue declined to 159 thousand cords, a decrease of 5 percent from last year. Increases in jack pine (647 thousand cords), red pine (368 thousand cords), hemlock (94 thousand cords), and tamarack (21 thousand cords) offset losses in cedar, balsam fir, and spruce (fig. 2).

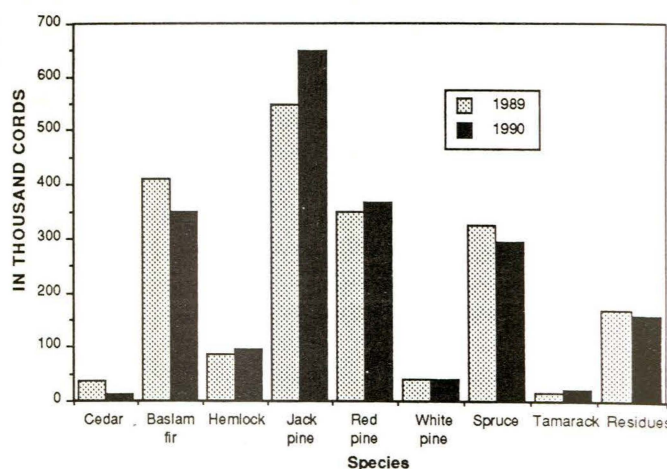


Figure 2.—Softwood pulpwood production in the Lake States, 1989-1990.

Table 1.—Production and imports of pulpwood, Lake States, 1990

(In standard cords, unpeeled)

Species and Destination	Production by State ¹				Imports		Total Imports	Total receipts
	Michigan	Minnesota	Wisconsin	Regional Total	Other U.S. ²	Canada		
Cedar								
Michigan	6,440	--	42	6,482	--	6	6	6,488
Minnesota	--	4,377	--	4,377	--	--	--	4,377
Total	6,440	4,377	42	10,859	--	6	6	10,865
Balsam fir								
Michigan	78,049	--	520	78,569	--	68	68	78,637
Minnesota	412	188,617	14,066	203,095	--	--	--	203,095
Wisconsin	7,863	121	50,969	58,953	--	--	--	58,953
Exported ³	--	8,601	--	8,601	--	--	--	--
Total	86,324	197,339	65,555	349,218	--	68	68	340,685
Hemlock								
Michigan	42,584	--	406	42,990	--	29	29	43,019
Wisconsin	2,923	--	37,606	40,529	--	--	--	40,529
Exported ³	10,464	--	--	10,464	--	--	--	--
Total	55,971	--	38,012	93,983	--	29	29	83,548
Jack pine								
Michigan	166,756	--	385	167,141	--	50	50	167,191
Minnesota	--	101,668	7,748	109,416	--	--	--	109,416
Wisconsin	60,389	6,573	297,748	364,710	--	--	--	364,710
Exported ³	--	6,002	--	6,002	--	--	--	--
Total	227,145	114,243	305,881	647,269	--	50	50	641,317
Red pine								
Michigan	53,422	--	203	53,625	--	26	26	53,651
Minnesota	--	14,640	7,067	21,707	--	--	--	21,707
Wisconsin	9,332	4,027	279,774	293,133	--	--	--	293,133
Total	62,754	18,667	287,044	368,465	--	26	26	368,491
White pine								
Michigan	9,179	--	62	9,241	--	8	8	9,249
Minnesota	--	4,536	152	4,688	--	--	--	4,688
Wisconsin	557	24	26,396	26,977	--	--	--	26,977
Total	9,736	4,560	26,610	40,906	--	8	8	40,914
Spruce								
Michigan	12,546	--	83	12,629	--	11	11	12,640
Minnesota	1,389	123,181	8,923	133,493	--	--	--	133,493
Wisconsin	39,539	46,013	39,692	125,244	--	--	--	125,244
Exported ³	12,560	10,462	--	23,022	--	--	--	--
Total	66,034	179,656	48,698	294,388	--	11	11	271,377
Tamarack								
Michigan	6,175	--	42	6,217	--	6	6	6,223
Minnesota	--	2,057	--	2,057	--	--	--	2,057
Wisconsin	1,957	2,337	8,464	12,758	--	--	--	12,758
Total	8,132	4,394	8,506	21,032	--	6	6	21,038
Total softwood roundwood								
Michigan	375,151	--	1,743	376,894	--	204	204	377,098
Minnesota	1,801	439,076	37,956	478,833	--	--	--	478,833
Wisconsin	122,560	50,095	740,649	913,304	--	--	--	913,304
Exported ³	23,024	25,065	--	48,089	--	--	--	--
Total	522,536	514,236	780,348	1,817,120	--	204	204	1,769,235
Residue, softwood								
Michigan	74,924	--	929	75,853	--	190	190	76,043
Minnesota	--	24,537	6,923	31,460	--	--	--	31,460
Wisconsin	8,578	1,877	40,322	50,777	107,519	18,770	126,289	177,066
Exported ³	--	731	--	731	--	--	--	--
Total	83,502	27,145	48,174	158,821	107,519	18,960	126,479	284,569
All softwoods								
Michigan	450,075	--	2,672	452,747	--	394	394	453,141
Minnesota	1,801	463,613	44,879	510,293	--	--	--	510,293
Wisconsin	131,138	51,972	780,971	964,081	107,519	18,770	126,289	1,090,370
Exported ³	23,024	25,796	--	48,820	--	--	--	--
Total	606,038	541,381	828,522	1,975,941	107,519	19,164	126,683	2,053,804

(Table 1 continued on next page)

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Species and Destination	Production by State ¹				Imports			Total receipts
	Michigan	Minnesota	Wisconsin	Regional Total	Other U.S. 2	Canada	Total Imports	
Ash								
Michigan	23,830	--	2,675	26,505	--	5	5	26,510
Minnesota	--	105	--	105	--	--	--	105
Wisconsin	3,980	--	68,092	72,072	--	--	--	72,072
Total	27,810	105	70,767	98,682	--	5	5	98,687
Aspen								
Michigan	1,010,565	--	57,290	1,067,855	--	496	496	1,068,351
Minnesota	--	1,610,704	26,271	1,636,975	--	2,240	2,240	1,639,215
Wisconsin	104,488	40,495	1,012,744	1,157,727	--	--	--	1,157,727
Exported ³	--	6,901	--	6,901	--	--	--	--
Total	1,115,053	1,658,100	1,096,305	3,869,458	--	2,736	2,736	3,865,293
Balsam poplar								
Michigan	60,486	--	238	60,724	--	107	107	60,831
Minnesota	--	52,966	2,524	55,490	--	--	--	55,490
Total	60,486	52,966	2,762	116,214	--	107	107	116,321
Basswood								
Michigan	43,274	--	6,519	49,793	--	15	15	49,808
Wisconsin	1,091	116	24,893	26,100	--	--	--	26,100
Total	44,365	116	31,412	75,893	--	15	15	75,908
Beech								
Michigan	28,527	--	417	28,944	--	44	44	28,988
Wisconsin	2,964	--	3,127	6,091	--	--	--	6,091
Total	31,491	--	3,544	35,035	--	44	44	35,079
White birch								
Michigan	169,434	1,061	73,703	244,198	--	68	68	244,266
Minnesota	--	575	--	575	--	--	--	575
Wisconsin	3,484	21,105	224,747	249,336	--	--	--	249,336
Total	172,918	22,741	298,450	494,109	--	68	68	494,177
Yellow birch								
Michigan	49,469	--	10,475	59,944	--	27	27	59,971
Wisconsin	5,819	--	22,035	27,854	--	--	--	27,854
Total	55,288	--	32,510	87,798	--	27	27	87,825
Cottonwood								
Michigan	104	--	--	104	--	--	--	104
Total	104	--	--	104	--	--	--	104
Elm								
Michigan	18,883	--	2,065	20,948	--	--	--	20,948
Wisconsin	62	--	23,126	23,188	--	--	--	23,188
Total	18,945	--	25,191	44,136	--	--	--	44,136
Hickory								
Wisconsin	--	--	4	4	--	--	--	4
Total	--	--	4	4	--	--	--	4
Hard maple								
Michigan	236,129	--	42,133	278,262	--	116	116	278,378
Wisconsin	30,012	--	222,201	252,213	--	--	--	252,213
Total	266,141	--	264,334	530,475	--	116	116	530,591
Soft maple								
Michigan	221,247	--	21,064	242,311	--	87	87	242,398
Minnesota	--	15,672	4,968	20,640	--	--	--	20,640
Wisconsin	12,425	3,976	164,061	180,462	--	--	--	180,462
Total	233,672	19,648	190,093	443,413	--	87	87	443,500
Red oak								
Michigan	96,871	--	5,836	102,707	--	2	2	102,709
Wisconsin	2,356	--	39,591	41,947	--	--	--	41,947
Total	99,227	--	45,427	144,654	--	2	2	144,656
White oak								
Michigan	43,287	--	--	43,287	--	--	--	43,287
Wisconsin	389	--	13,541	13,930	--	--	--	13,930
Total	43,676	--	13,541	57,217	--	--	--	57,217
Other hardwoods								
Michigan	21,100	--	3,245	24,345	--	31	31	24,376
Wisconsin	4,040	--	7,952	11,992	--	--	--	11,992
Total	25,140	--	11,197	36,337	--	31	31	36,368

(Table 1 continued on next page)

(Table 1
continued)

(continued)

Species and Destination	Production by State ^{1/}				Regional Total	Imports		Total Imports	Total receipts
	Michigan	Minnesota	Wisconsin	Other U.S. 2/		Canada			
Total hardwood roundwood									
Michigan	2,023,206	1,061	225,660	2,249,927	--	998	998	2,250,925	
Minnesota	--	1,680,022	33,763	1,713,785	--	2,240	2,240	1,716,025	
Wisconsin	171,110	74,692	1,826,114	2,071,916	--	--	--	2,071,916	
Exported ^{3/}	--	6,901	--	6,901	--	--	--	--	
Total	2,194,316	1,762,676	2,085,537	6,042,529	--	3,238	3,238	6,038,866	
Residue, hardwoods									
Michigan	171,355	--	14,555	185,910	20,946	2,029	22,975	208,885	
Minnesota	--	56,068	4,091	60,159	--	--	--	60,159	
Wisconsin	10,699	--	160,643	171,342	--	--	--	171,342	
Total	182,054	56,068	179,289	417,411	20,946	2,029	22,975	440,386	
All hardwoods									
Michigan	2,194,561	1,061	240,215	2,435,837	20,946	3,027	23,973	2,459,810	
Minnesota	--	1,736,090	37,854	1,773,944	--	2,240	2,240	1,776,184	
Wisconsin	181,809	74,692	1,986,757	2,243,258	--	--	--	2,243,258	
Exported ^{3/}	--	6,901	--	6,901	--	--	--	--	
Total	2,376,370	1,818,744	2,264,826	6,459,940	20,946	5,267	26,213	6,479,252	
All wood material									
Michigan	2,644,636	1,061	242,887	2,888,584	20,946	3,421	24,367	2,912,951	
Minnesota	1,801	2,199,703	82,733	2,284,237	--	2,240	2,240	2,286,477	
Wisconsin	312,947	126,664	2,767,728	3,207,339	107,519	18,770	126,289	3,333,628	
Exported ^{3/}	23,024	32,697	--	55,721	--	--	--	--	
Total	2,982,408	2,360,125	3,093,348	8,435,881	128,465	24,431	152,896	8,533,056	

^{1/} Vertical columns of figures under the box heading "Production by States", present the amount of pulpwood cut in each State.

^{2/} Mostly Western States.

^{3/} Pulpwood shipped to mills outside of region.

Whole-tree chip⁶ (WTC) production in the Lake States dropped 18 percent to 518 thousand cords, about 6 percent of total production. Aspen WTC production declined by 123 thousand cords or 35 percent between 1989 and 1990 (fig. 3). Other hardwoods (soft maple, hard maple, red oak, white oak, white birch, and basswood) increased in WTC production by 11 percent to 234 thousand cords.

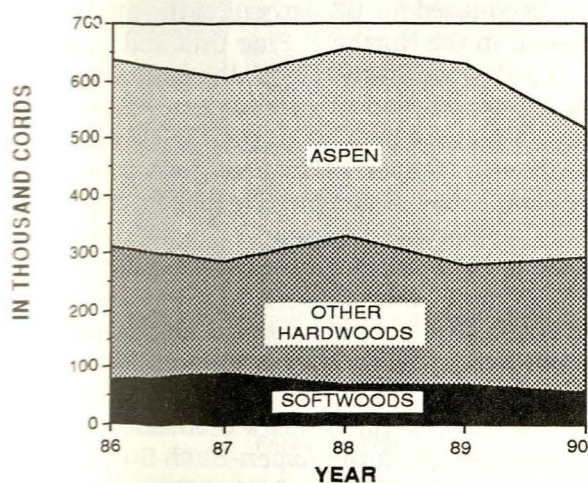


Figure 3.—Whole-tree chip production in the Lake States, 1986-1990.

⁶ Pulpwood produced from chipping entire trees (all portions of the trees above ground, except the stumps).

Michigan was the major producer of whole-tree chips in the Lake States in 1990 with 414 thousand cords (80 percent). Loggers in the northern Lower Peninsula of Michigan harvested 278 thousand cords (54 percent) of WTC production that year (fig. 4).

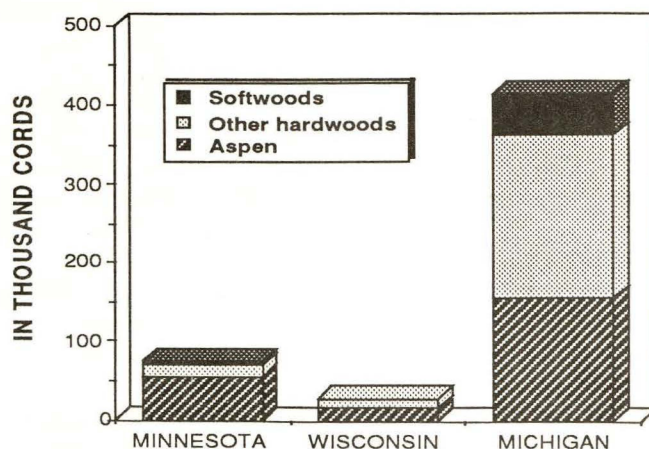


Figure 4.—WTC production by State in the Lake States, 1990.

Jack pine was the predominant softwood species harvested for WTC in 1990 with 93 percent of the softwood WTC production and 10 percent of the total WTC production.

Michigan—Pulpwood production dropped 4 percent from the 1989 record high of 3.1 million cords to 3.0 million cords (fig. 5). Increases in aspen and pine production offset the drop in spruce-fir and other hardwoods (white birch, yellow birch, basswood, hard maple, soft maple, and red oak).

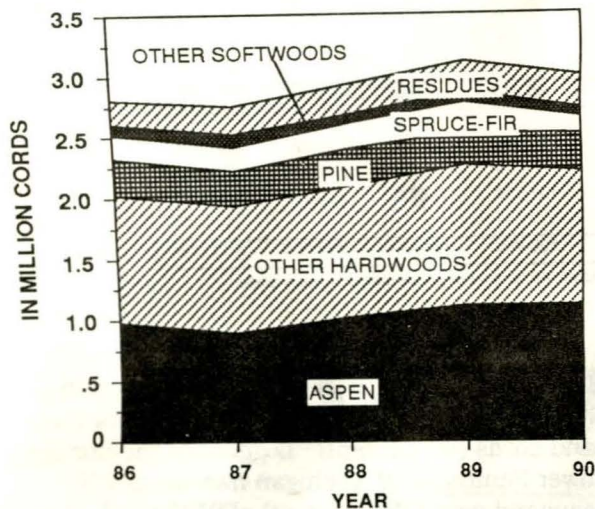


Figure 5.—Michigan pulpwood production by species group and residues, 1986-1990

The western Upper Peninsula Survey Unit was the top producing region in Michigan with 36 percent of the roundwood harvested in 1990 (fig. 6). Other hardwoods (hard maple, soft maple, beech, basswood, white birch, and yellow birch) accounted for 44 percent of the pulpwood harvested in the western Upper Peninsula Unit and 16 percent of pulpwood harvested in the entire State. Aspen pulpwood production increased by 1 percent over the 1,104 thousand cords produced in 1989. Aspen harvest for pulpwood was the highest in the northern Lower Peninsula Survey Unit with 515 thousand cords (55 percent)—19 percent of the State total.

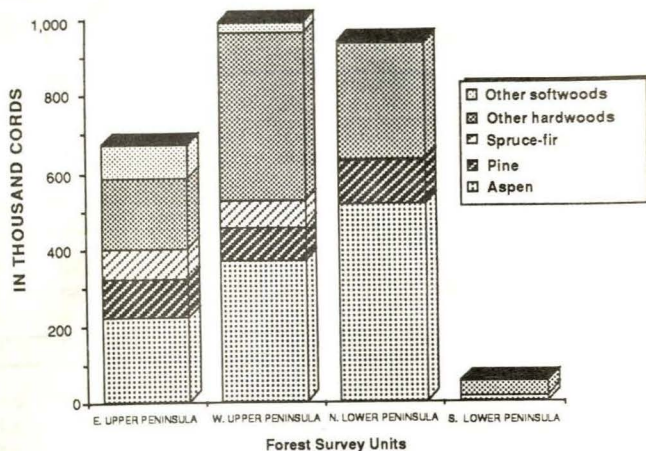


Figure 6.—Michigan pulpwood production by Forest Survey Unit and species groups, 1990.

Marquette County in the western Upper Peninsula Unit was the top producer in Michigan in 1990 with 252 thousand cords. The second largest producer of pulpwood was Delta County with 225 thousand cords—a 9-percent increase from the 1989 harvest of 207 thousand cords. Other counties that produced 100 thousand cords or more were Menominee, Dickinson, Gogebic, Iron, and Ontonagon.

Minnesota—Pulpwood production increased 4 percent to 2.4 million cords in 1990 (fig. 7). The Northern Pine Survey Unit remained the top pulpwood producing area in Minnesota (fig. 8). Aspen accounted for 62 percent of the pulpwood harvested in the Northern Pine Unit and 27 percent of pulpwood harvested in the entire State. Softwood roundwood production in 1990 increased 5 percent or 24 thousand cords over the previous year. Aspen increased to a new high of 1.7 million cords, 5 percent over 1989. Spruce production increased 10 percent to its highest level since 1975. Jack pine pulpwood harvest in 1990 increased by 15 percent over 1989 to 15 thousand cords; red pine production dropped 37 percent from 30 thousand cords to 19 thousand cords. Cedar pulpwood production (reported for the first time) was 4 thousand cords. St. Louis County, in the Aspen-Birch Survey Unit, remained the top producing county in

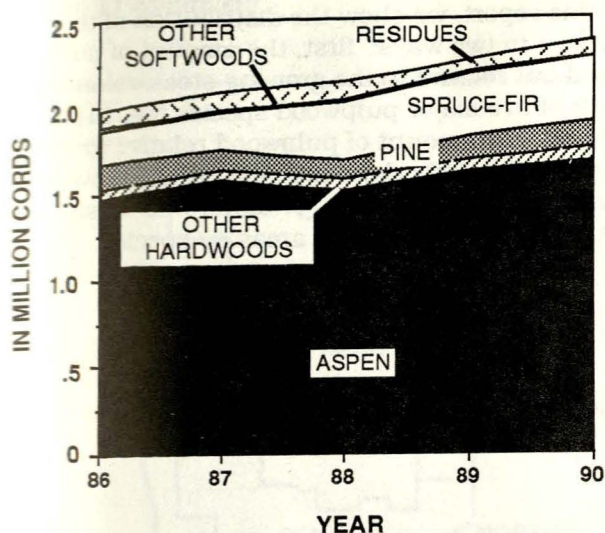


Figure 7.—Minnesota pulpwood production by species group and residues, 1986-1990.

1990 with 510 thousand cords—a 4-percent increase from 1989. Itasca County was the second largest producer of pulpwood in Minnesota with 380 thousand cords—an 8-percent drop from the 1989 harvest of 415 thousand cords. Counties producing more than 100 thousand cords were Koochiching, Beltrami, Cass, and Lake.

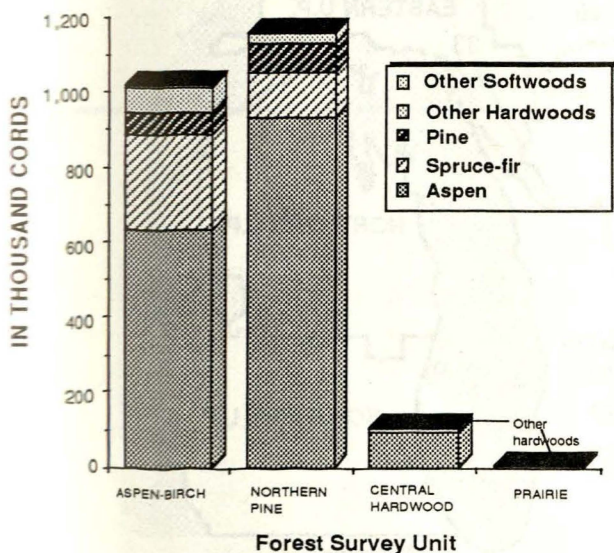


Figure 8.—Minnesota pulpwood production by Forest Survey Unit and species group, 1990.

Wisconsin—Production dropped 2 percent to 3.1 million in 1990. The decrease was mainly in aspen output (fig. 9).

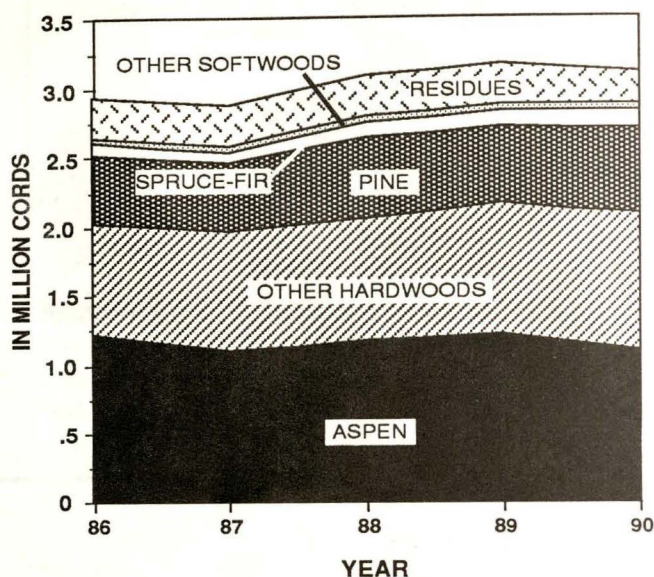
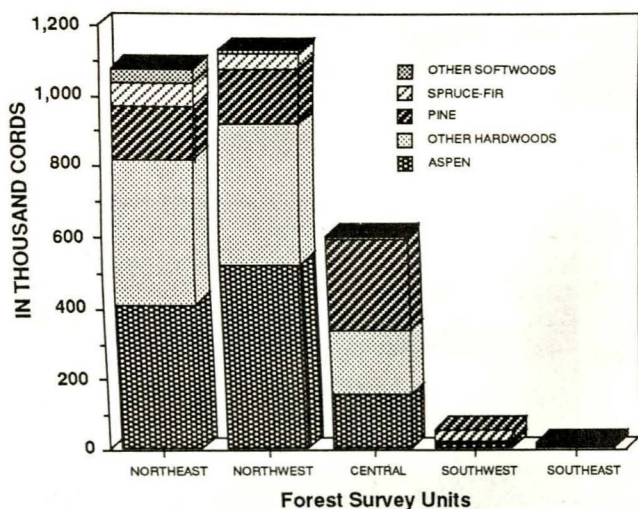


Figure 9.—Wisconsin pulpwood production by species group and residues, 1986-1990.

Aspen harvest dropped 9 percent from 1,208 thousand cords in 1989. Other hardwoods (hard maple, soft maple, white birch, ash, basswood, elm, and yellow birch) accounted for 34 percent of the 1990 pulpwood production in Wisconsin. Pine pulpwood production in the State accounted for 22 percent of the total harvested. Jack pine was the major softwood species harvested with 39 percent of all softwoods. The Northwest and Northeast Survey Units were the top pulpwood producing areas in Wisconsin with 39 percent and 37 percent of the State harvest, respectively (fig. 10). The Central Survey Unit was the largest producer of pine pulpwood with 42 percent of all pine harvested in Wisconsin. Marinette County in the Northeast Unit was the top pulpwood producing county in the State with 188 thousand cords—an 11-percent increase from 1989. The second largest pulpwood producing county was Oneida with 180 thousand cords, a 20-percent increase over 1989. Top-producing counties with 100 thousand cords or more were Bayfield, Sawyer, Forest, Langlade, Lincoln, Ashland, Douglas, Price, and Vilas.



In this report, we show the distribution of the harvest in two ways: first, the amount of pulpwood cut relative to the growing-stock volume in each of five major pulpwood species (fig. 11) and second, the amount of pulpwood relative to commercial timberland area (fig. 12). Pulpwood harvesting (80,000 cords or more) was most intensive in the following areas by species:

Figure 10.—Wisconsin pulpwood production by Forest Survey Unit and species group, 1990.

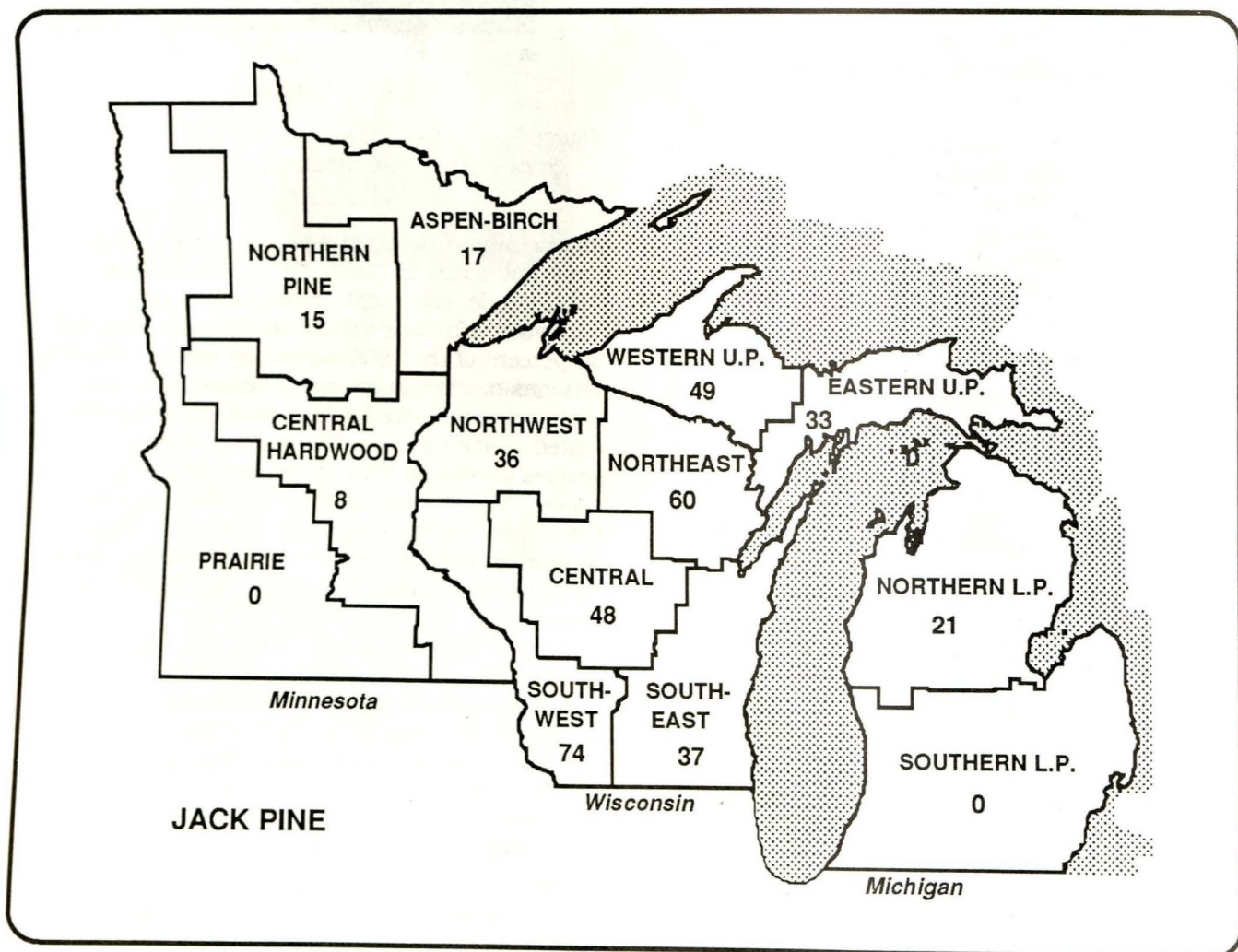
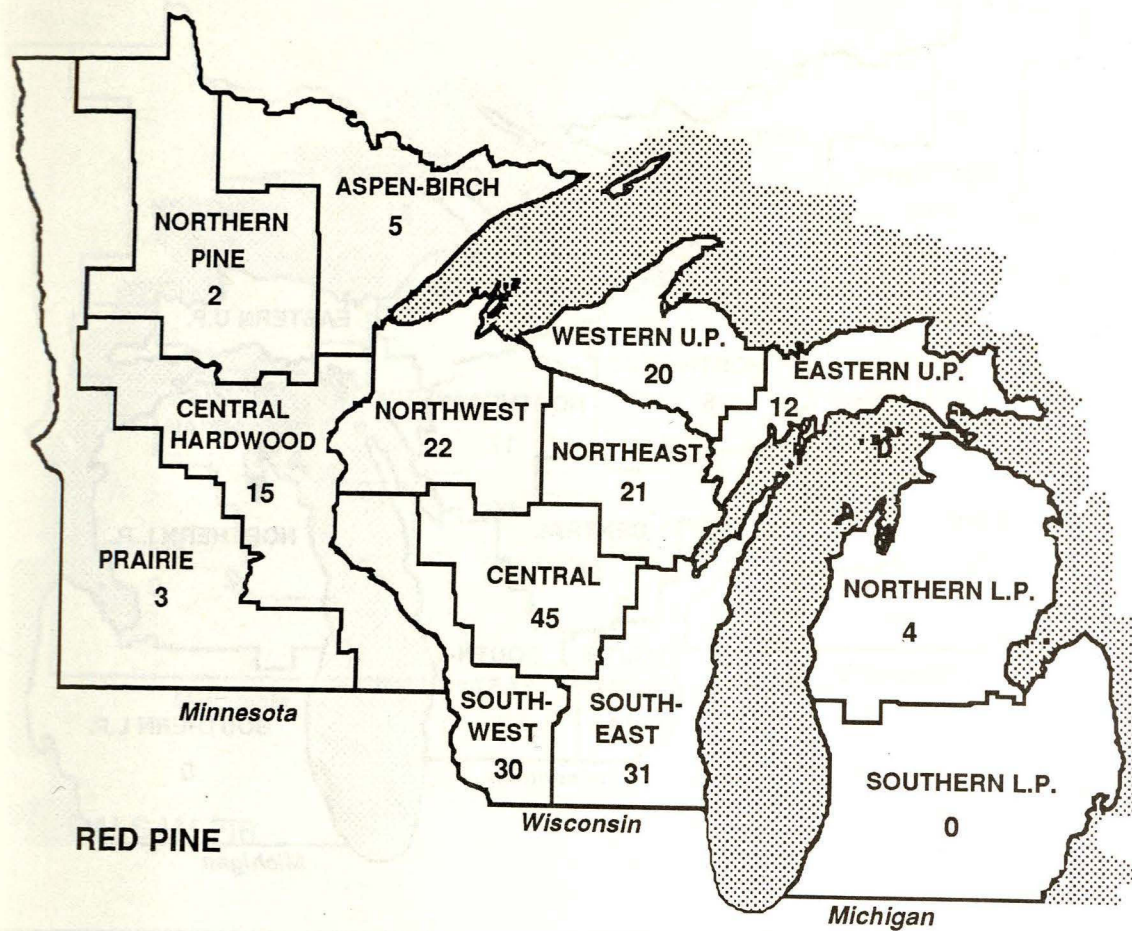
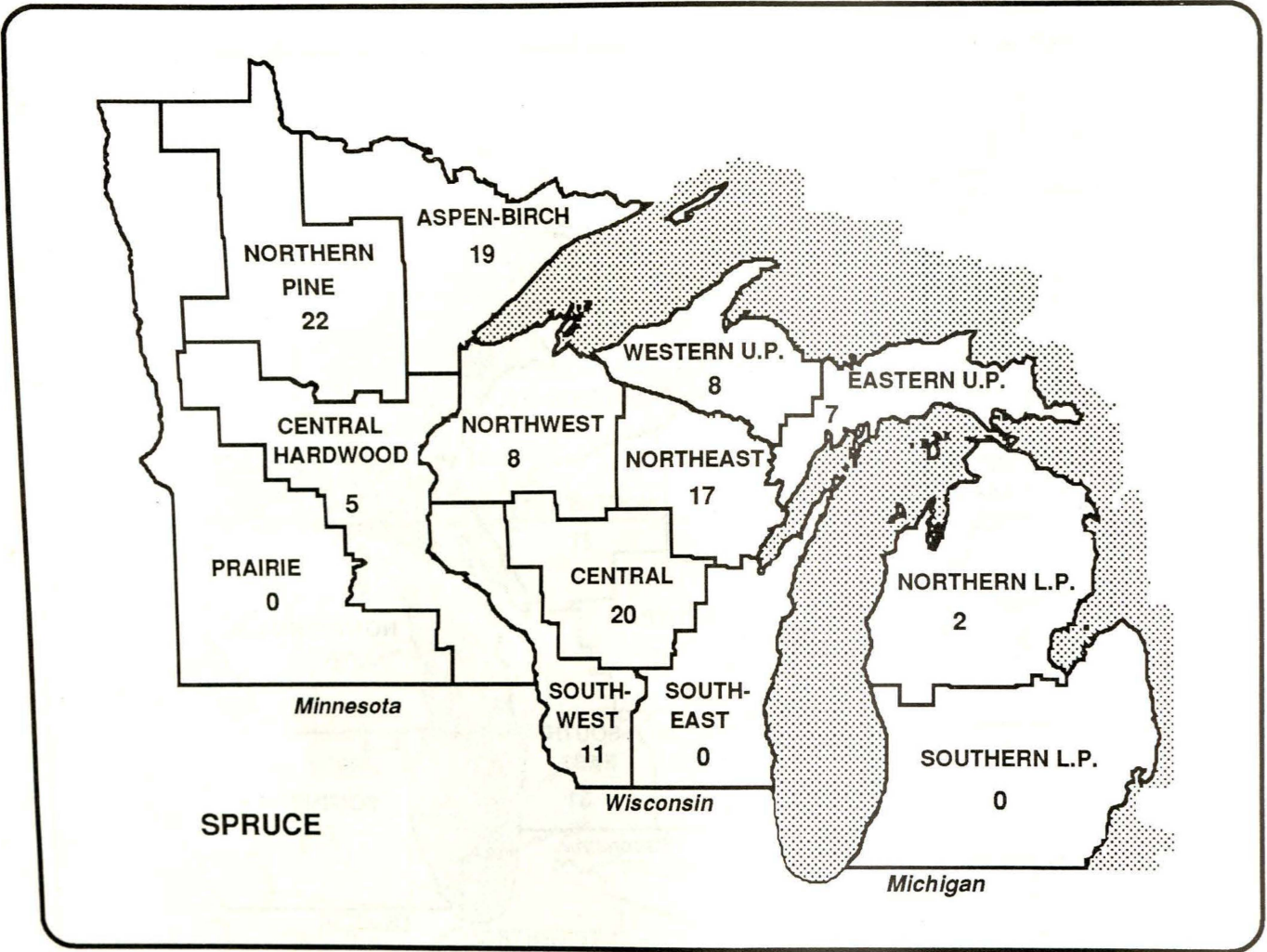


Figure 11.—Cords of roundwood pulpwood (including chips from roundwood) harvested per 1,000 cords of growing-stock volume for each of five principal pulpwood species by Forest Survey Unit, 1989. Growing-stock volume was determined during the last forest inventory in each State.

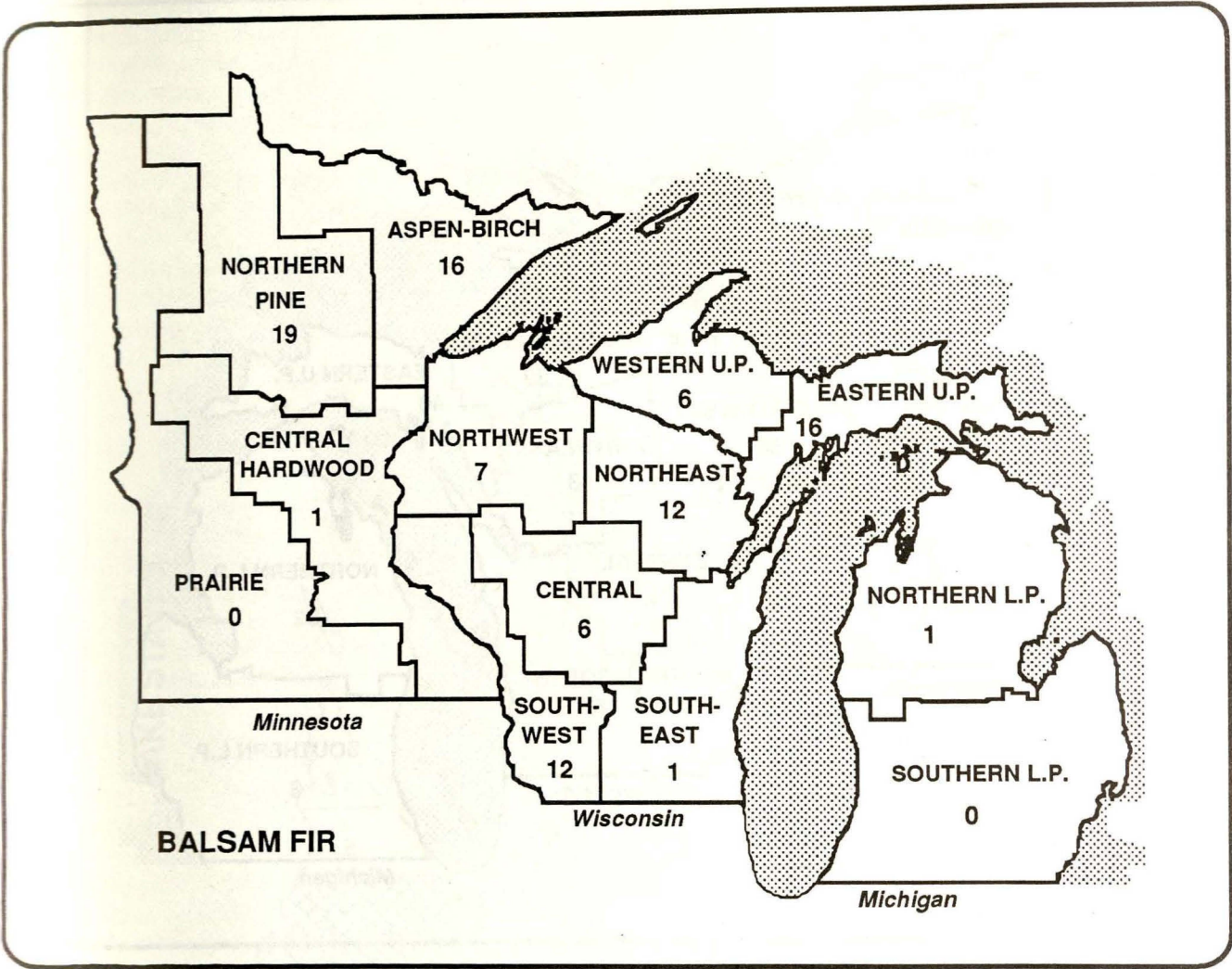
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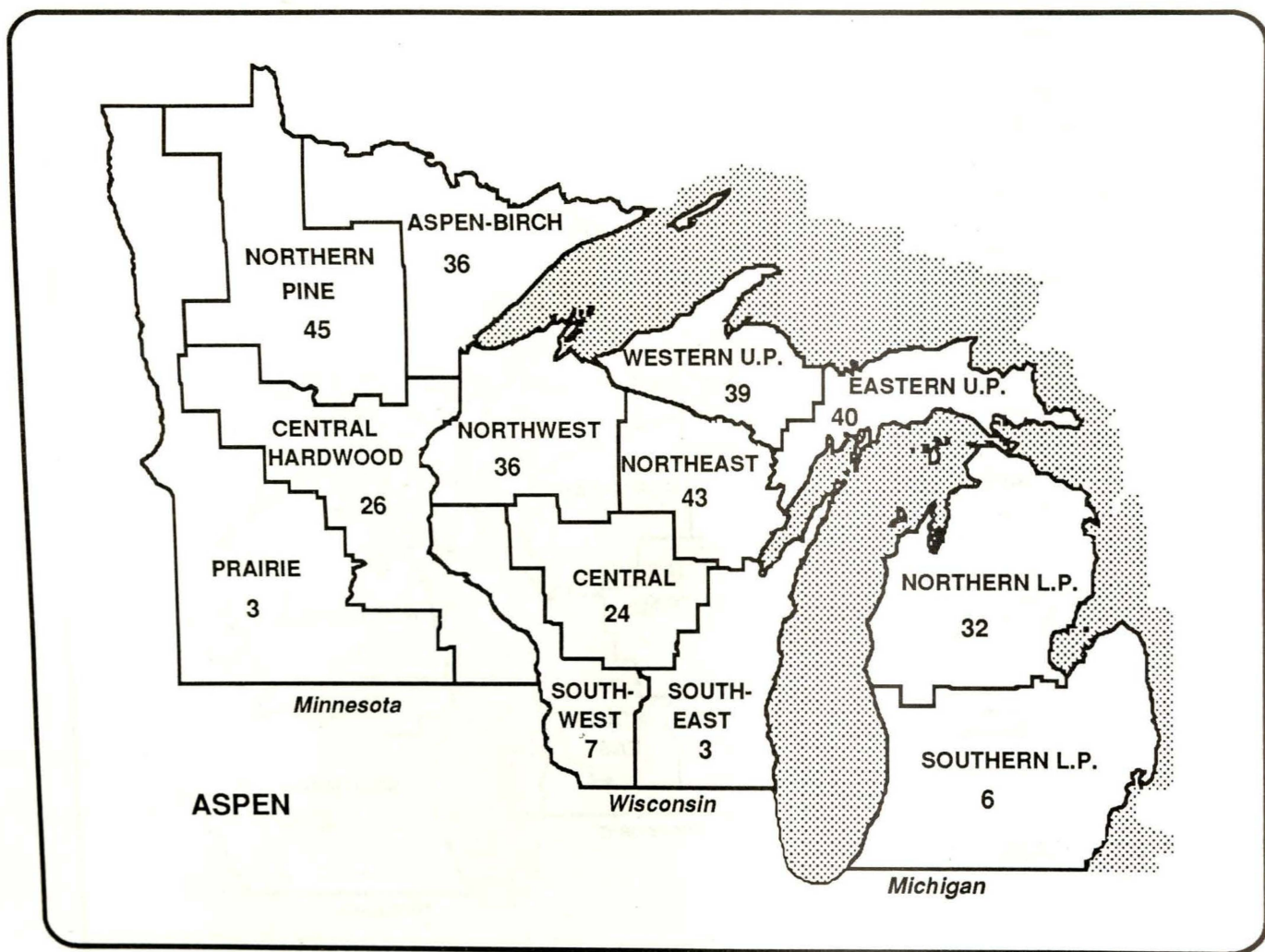
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(Figure 11 continued)



(Figure 11 continued)



Species	State	Survey Unit
Jack pine	Wisconsin	Northwest, Central
	Michigan	Northern Lower Peninsula
Red pine	Wisconsin	Central
Spruce	Minnesota	Aspen-Birch
Balsam fir	Minnesota	Aspen-Birch, Northern Pine
Aspen	Minnesota	Aspen-Birch, Northern Pine
		Central Hardwood
	Wisconsin	Northeast, Northwest, Central
	Michigan	E. Upper Peninsula, W. Upper Peninsula, N. Lower Peninsula

Cutting of certain species may exceed net growth in several Survey Units of the Lake States. This disparity is probably due to disease and mortality occurring in these species. Harvesting of overmature stands of timber may be another reason. Future field surveys should help clarify these points.

Receipts

Thirty-six woodpulp and twelve particleboard mills acquired 8.5 million cords of pulpwood in 1990, down 1 percent from 1989. The number of mills using aspen stayed constant at 40 (83 percent). There was increased use of birch, pine, softwood residues, and hardwood residues at some mills (fig. 13).

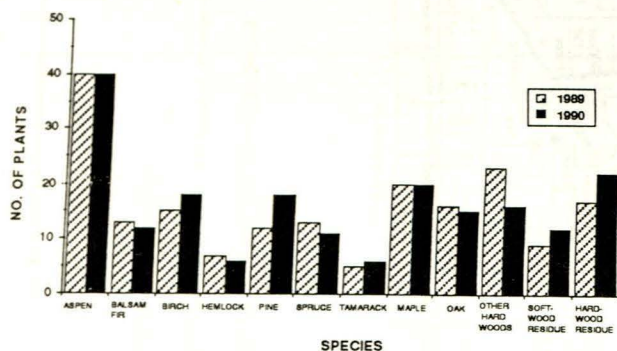


Figure 13.—Numbers of industrial plants in the Lake States using a particular species or residue for pulping and particleboard, 1989-1990.

The Lake States provide many woodpulp mills with raw material. In 1990, Wisconsin supplied wood to 26 mills, Michigan supplied 26 mills, and Minnesota supplied 25 mills. Pulpwood mills outside the Lake States also received raw material from this region. Some 56 thousand cords were exported, mainly to Canada; Minnesota exported 33 thousand cords, and Michigan exported 23 thousand cords.

Softwood residue imported from Canada rose 36 percent in 1990 to 19 thousand cords. Softwood residue shipped from other States (outside the region) increased 19 percent to 107 thousand cords. The main suppliers of the softwood residue from outside the Lake States were Montana, South Dakota, and Wyoming.

Michigan—Eleven Michigan mills consumed 2.9 million cords or 7 percent less than in 1989. An estimated 268 thousand cords were supplied by out-of-State sources—down 10 percent from 1989. Wisconsin provided more than 90 percent of the imported wood. White birch, hard maple, aspen, red oak, and soft maple were the primary species imported.

Wisconsin—The 22 mills in Wisconsin consumed 3.3 million cords as in 1989. Of that total, 566 thousand cords were supplied by out-of-State sources—an increase of 5 percent from last year. Michigan supplied 313 thousand cords, Minnesota supplied 127 thousand cords, and Western States supplied 108 thousand cords. Principal imports were aspen, spruce, jack pine, and hard maple.

Minnesota—The 15 mills in Minnesota reported an estimated 2.3 million cords; Minnesota pulpwood receipts are not fully reported (see earlier explanation). Wisconsin furnished 83 thousand cords, Michigan supplied 2 thousand cords, and Canada supplied 2 thousand cords. Principal imports were aspen, balsam fir, spruce, and jack pine.

Industry Trends and Analysis

Woodpulp Mills

In this section woodpulp mills will include those mills that produce wood fiber products such as paper, paperboard, hardboard, insulation board, and medium-density fiber board. All of these products are manufactured from wood that has been reduced to individual fibers, small fiber bundles, or fiber parts that are then formed into a mat.

Of the 8.4 million cords of pulpwood harvested in 1990, 6.2 million cords (74 percent) were used for wood fiber products (woodpulp). Of each cord used to produce woodpulp, 93 percent was roundwood and 7 percent was residues.

Principal species harvested for woodpulp were aspen (2.0 million cords), jack pine (534 thousand cords), hard maple (522 thousand cords), and white birch (477 thousand cords). Other major species furnishing more than 200 thousand cords were balsam fir, red pine, spruce, and soft maple. Hardwood and softwood residue accounted for 450 thousand cords for pulp in 1990.

Harvesting of aspen for woodpulp has fallen off gradually while harvesting of other hardwood species has increased. Softwood harvests have grown steadily since 1988 (fig. 14). Residues for the same period have been steady at 450 to 500 thousand cords.

Average daily woodpulp production was 11.5 thousand tons in 1990 (table 3). Kraft mills accounted for one-third of the total woodpulp production, and groundwood and other mechanical process mills accounted for another one-third. The remaining one-third was split between sulfite and semi-chemical process mills.

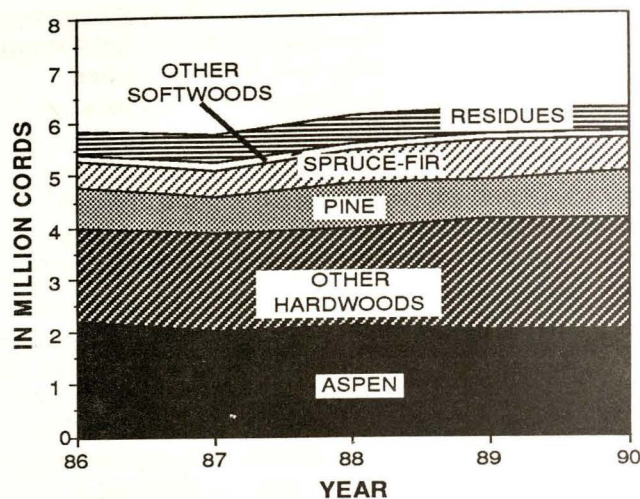


Figure 14.—Pulpwood production in the Lake States for woodpulp by species group and residues, 1986-1990.

Lake States pulpwood production for pulp mills in 1988-1990 was:

Species	Production		
	1988	1989	1990
(Thousand cords)			
Roundwood			
Aspen	2,077	2,008	2,029
Softwoods	1,632	1,662	1,677
Other species	1,888	2,090	2,070
Residue	519	470	450
Total	6,116	6,230	6,226

Michigan—Pulpwood production for woodpulp was 2.1 million cords in 1990. Aspen was the major pulpwood species harvested in Michigan with 577 thousand cords. Other species that contributed large amounts of wood were white birch (157 thousand cords) and jack pine (132 thousand cords). Hardwood residue was a major contributor to the pulp industry with 149 thousand cords; softwood residue was 19 thousand cords.

Michigan's primary woodpulp industry manufactures paper, corrugating medium, hardboard, and market pulp (pulp sold to other paper manufacturers). An estimated 5,000 tons of woodpulp products are generated daily from seven primary woodpulp mills. One mill uses groundwood processing, two mills use kraft processing, three use semi-chemical process, and one mill uses both groundwood and kraft processing (table 3).

Michigan mills imported 211 thousand cords for woodpulp production in 1990. Minnesota furnished 1 thousand cords, Wisconsin provided 188 thousand cords, Western States provided 21 thousand cords, and Canada shipped 1 thousand cords. Michigan exported 23 thousand cords to other States outside the region for woodpulp. Spruce (13 thousand cords) and hemlock (10 thousand cords) were the two species exported.

Minnesota—Pulpwood harvested for woodpulp products totaled 1.4 million cords in 1990. Aspen was the predominant species harvested in Minnesota with 684 thousand cords. Balsam fir (197 thousand cords) and spruce (180 thousand cords) were second and third, respectively. Jack pine was the only other species harvested for woodpulp with more than 100 thousand cords. Hardwood and softwood residues for woodpulp amounted to 56 thousand cords and 25 thousand cords, respectively.

The primary woodpulp products industries in Minnesota are paper, hardboard, roofing felt, and insulation board. An estimated 4,500 tons of woodpulp products are produced daily in the 10 primary woodpulp mills. The process used in these mills to breakdown the wood into fiber are groundwood (eight mills) and kraft (two mills) (table 3).

Of the 87 thousand cords Minnesota mills received for woodpulp products, Michigan provided 2 thousand cords, Wisconsin furnished 83 thousand cords, and Canada provided 2 thousand cords. Minnesota exported 33 thousand

cords to other States and Canada. Predominant species exported were balsam fir (9 thousand cords), jack pine (6 thousand cords), spruce (11 thousand cords), and aspen (7 thousand cords).

Wisconsin—Pulpwood harvested for woodpulp products was 2.7 million cords. Aspen was the main species harvested with 1.9 million cords in 1990. Other species that provided more than 100 thousand cords were; jack pine (306 thousand cords), white birch (298 thousand cords), red pine (287 thousand cords), hard maple (264 thousand cords), and soft maple (190 thousand cords). Softwood residue for woodpulp accounted for 48 thousand cords, and hardwood residue accounted for 179 thousand cords.

A less than 1 percent decrease in pulpwood production for woodpulp mills in the Lake States during 1990 compares favorably with the 2.4-percent rise in U.S. paper and paperboard production. Total output of the U.S. paper and paperboard industry for 1990 was 78.6 million tons (39.4 million tons of paper and 39.2 million tons of paperboard).

Particleboard mills

Particleboard is a generic term for a panel manufactured from lignocellulosic materials—commonly wood—in the form of particles (as distinct from fibers). These materials are bonded together with synthetic resin or other suitable binder, under heat and pressure, by a process in which the interparticle bonds are created wholly by the added binder. Most particleboard in the U.S. is made from residues (shavings, sawdust, or chips), but some types such as wafer board require that the particles be cut from solid wood (saw logs or pulpwood).

Loggers in the Lake States harvested 2.2 million cords in 1990 for particleboard products. For every 100 cords used to produce particleboard products, 94 percent came from roundwood and 6 percent was residues from wood-using plants (sawmills, veneer mills, etc.).

Principal species harvested for particleboard products were aspen (1.8 million cords), jack pine (113 thousand cords), and soft maple (40 thousand cords). Other major species used were red pine and white birch. Residues used in particleboard production totaled 126 thousand cords (fig. 15).

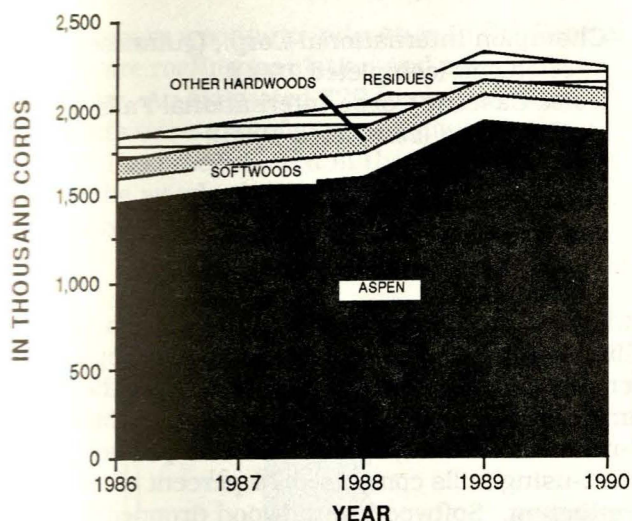


Figure 15.—Pulpwood production for particleboard in the Lake States, 1986-1990.

Annual production capacity of the Lake States particleboard plants:

Company	Location	Production capacity (Million square feet 3/4-inch basis)
Georgia-Pacific	Gaylord, MI	241
Louisiana-Pacific	Newberry, MI	50
Louisiana-Pacific	Sagola, MI	140
Weyerhaeuser Co.	Grayling, MI	170
Louisiana-Pacific	Two Harbors, MN	75
Blandin Wood Products Co.*	Grand Rapids, MN	165
Northwood Panelboard Co.	Bemidji, MN	150
Potlatch Corp.	Bemidji, MN	112
Potlatch Corp.	Cook, MN	112
Louisiana-Pacific	Hayward, WI	130
Rodman Industries	Marinette, WI	22
Weyerhaeuser Co.	Marshfield, WI	135
All companies		1,502

*Sold to Potlatch Corp. 6/90

Lake States pulpwood production for particleboard mills in 1988-1990 was:

Species	Production (Thousand cords)		
	1988	1989	1990
Roundwood			
Aspen	1,605	1,914	1,840
Softwoods	135	144	140
Other species	148	89	103
Residue	131	161	126
Total	2,019	2,308	2,209

Michigan—Pulpwood harvested for particleboard products was 842 thousand cords. Aspen logged in the State for particleboard totaled 538 thousand cords in 1990. Other major species cut were jack pine (95 thousand cords) and soft maple (39 thousand cords). Hardwood and softwood residues used for particleboard totaled 97 thousand cords.

Michigan's particleboard industry produces oriented-strand board and oriented waferboard. An estimated 613 million square feet at three-fourths of an inch thickness was produced by the four mills in Michigan in 1990. Three mills used roundwood for raw material, and one mill used chips from the field and residues.

The particleboard mills in Michigan imported hardwood and softwood residues from Canada amounting to 2 thousand cords. Michigan mills also received 6 thousand cords of aspen from Wisconsin. Exports of raw materials for particleboard production amounted to 20 thousand cords; half was aspen and half was residues.

Minnesota—Pulpwood logged for particleboard products totaled 997 thousand cords. The predominant species cut was aspen (947 thousand cords)—98 percent of the total. The remaining 2 percent was jack pine (12 thousand cords), balsam poplar (9 thousand cords), and softwood residues (2 thousand cords).

Minnesota's particleboard industry produces oriented-strand board and oriented waferboard. Particleboard output from the mills in the State was an estimated 582 million square feet at three-fourths of an inch thickness for 1990. Roundwood was the predominant form of raw material used for particleboard products in Minnesota.

The particleboard mills in Minnesota did not import any raw materials for production. In 1990, raw materials exported from the State for particleboard manufacturing totaled 30 thousand cords; 27 thousand cords of aspen and 3 thousand cords of softwood residues were shipped to Wisconsin.

Wisconsin—Wisconsin produced 371 thousand cords of wood for particleboard manufacturing. The main species harvested was aspen (328 thousand cords)—88 percent of the total. Other major species cut were jack pine (7 thousand cords), red pine (4 thousand cords), and balsam fir and white pine with 2 thousand cords each. The remaining raw material used was softwood residue (10 thousand cords) and hardwood residue (18 thousand cords).

The particleboard industry in Wisconsin produces oriented strand board. Wisconsin's particleboard output totaled an estimated 267 million square feet at three-fourths of an inch thickness in 1990. The mills used roundwood and residues equally for raw material in manufacturing particleboard products.

The mills in Wisconsin imported 23 thousand cords of wood for particleboard manufacturing. Canada provided 3 thousand cords of softwood residues, and Michigan provided 10 thousand cords of aspen and 10 thousand cords of residues. Wisconsin exported 55 thousand cords of aspen to Michigan mills in 1990.

Nationally housing starts dropped 14 percent in 1990 to 1.2 million units, accounting for a 4-percent decrease in Lakes States pulpwood production used in the manufacture of particleboard products.

New Mills and Expansions in 1990

New mills:

MacMillan Boedel Corp. of America, Deerpark, Minnesota (completed 1990).
Canadian Pacific Forest Products LTD., Thunder Bay, Ontario (completed 1991).

Major pulpmill expansions:

Champion International Corp., Quinnesec, Michigan (completed 1990).
Boise Cascade Corp., International Falls, Minnesota (completed 1991).

CENTRAL STATES

Production

Pulpwood production in the Central States (Illinois, Indiana, Iowa, and Missouri) dropped 6 percent from the 1989 production of 396 thousand cords to current production of 374 thousand cords. Hardwood residue from primary wood-using mills comprised 74 percent of total production. Softwood roundwood dropped from 10 thousand cords in 1989 to 9 thousand cords in 1990 (fig. 16).

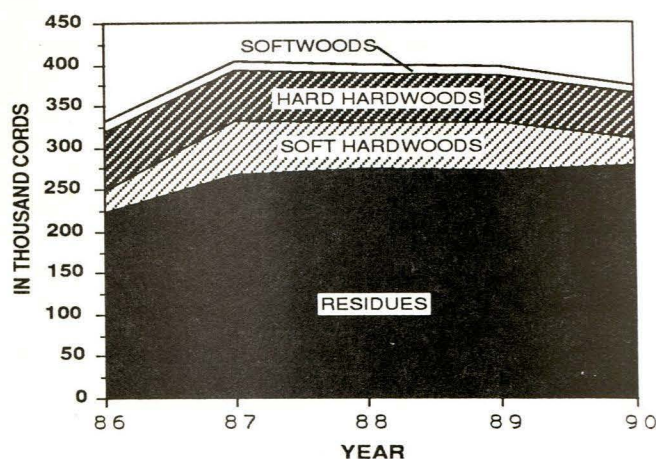


Figure 16.—Pulpwood production in the Central States, 1986-1990.

Soft hardwood⁷ roundwood production decreased 46 percent, and hard hardwood⁸ decreased 2 percent in 1990. Exports from the Central States (mainly hardwood residue) decreased 8 percent to 233 thousand cords. Central States producers shipped wood to Kentucky, Wisconsin, Oklahoma, and Michigan mills.

The primary woodpulp industries in the Central States are roofing insulation and corrugating-medium. An estimated 720 tons of woodpulp products were manufactured daily from three mills. The process used in these mills to break down the wood into fiber is semi-chemical and mechanical.

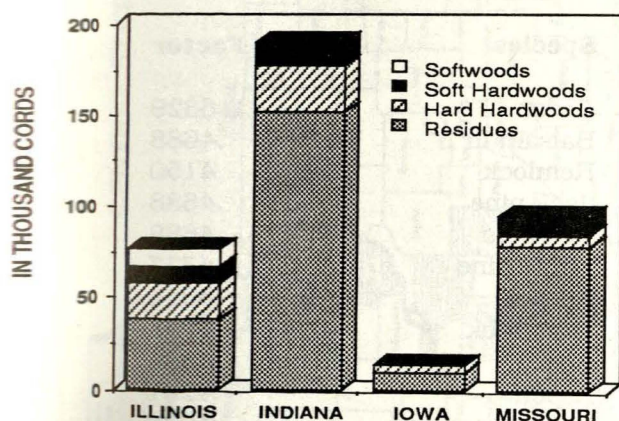


Figure 17.—Central States pulpwood production by species group, 1990.

⁷ Hardwood species with an average specific gravity of 0.50 or less (cottonwood, basswood, black gum, etc.).

⁸ Hardwood species with an average specific gravity greater than 0.50 (all oaks, sugar maple, black locust, green ash, etc.).

Illinois—Illinois produced 76 thousand cords of pulpwood in 1990—20 percent of the total production in the Central States (fig. 17). Hard hardwood roundwood was the largest species group harvested with 26 percent of the State total. Both softwoods and soft hardwoods were harvested at 12 percent each for the total pulpwood production in Illinois. Hardwood residues accounted for the other half of the pulpwood production in Illinois.

Illinois does not have any woodpulp mills. All pulpwood harvested is shipped to plants in the three other Central States or to mills outside the area. Of the wood harvested for pulp about 43 percent was shipped to mills in the Central States—mainly in Indiana and Iowa. States outside the North-Central Region received the remaining 57 percent.

Indiana—Indiana produced more than 50 percent of the total pulpwood harvested in the Central States Region in 1990—189 thousand cords. Roundwood pulpwood production in Indiana was 38 thousand cords or 20 percent of the State total. The hard hardwood species group had the highest production of roundwood with 68 percent. Soft hardwoods accounted for the remaining 32 percent of the roundwood harvested. Hardwood residues accounted for 80 percent of the pulpwood produced in Indiana.

Pulpwood shipped to mills outside the region totaled 114 thousand cords—60 percent of the State's total pulpwood production. The remaining 40 percent was used by mills in the Central and Lakes States regions.

Iowa—The total pulpwood production in 1990 was 14 thousand cords—4 percent of the region's total. The hard hardwood species group was the only roundwood harvested for woodpulp at 4 thousand cords or 29 percent of the State's total pulpwood production. Hardwood residue was the main source of pulpwood in Iowa at 10 thousand cords.

Missouri—Missouri is the second largest producer of pulpwood material in the Central States region at 95 thousand cords or 25 percent of the region's total. Soft hardwood roundwood accounted for 11 percent of the State's total pulpwood production—largest roundwood species group harvested in the State for pulp. Hard hardwood roundwood species had the remaining 6 thousand cords or 6 percent of the total pulpwood harvested in Missouri. Hardwood residues at 80 percent of the total pulpwood production in the State was the main source of wood fiber.

Missouri exported 76 thousand cords or 80 percent of the pulpwood it produced to mills outside the region.

Loggers harvested pulpwood in 18 counties of Illinois; 14 counties in western and central Indiana; 4 counties in eastern Iowa; and 12 counties in northeast, central, and southeast Missouri (fig. 18).

Receipts

Pulp mills in three Central States received 141 thousand cords in 1990, down 1 percent from 1989. Total roundwood receipts dropped 17 percent in 1990 from 53 thousand cords in 1989. Soft hardwood roundwood accounted for an 11-percent decline in receipts. However, a 60-percent increase in hard hardwood roundwood offset a major decline in pulpwood production. Hardwood residue increased 7 percent from 91 thousand cords in 1989 to 97 thousand cords in 1990. No softwoods were used for the seventh consecutive year in the Central States.

Industry Trends and Analysis

Average daily woodpulp production increased 9 percent to 510 tons in 1989 (table 5).

Mills in adjacent States are expected to remain the dominant markets for Central States pulpwood, and imports will continue at about 140 thousand cords.

Hardwood residue from sawmills continue to be the dominant form of pulpwood procured from primary wood-using mills in the Central States.

Central States roundwood production for pulpwood was 96 thousand cords in 1990, down 23 percent from the 1989 total of 125 thousand cords.

APPENDIX

Conversion Factors Used In The Lake States

Standard cords of green roundwood per green ton: (cords/ton)

Species	Factor
Cedar	0.6329
Balsam fir	.4688
Hemlock	.4150
Jack pine	.4688
Red pine	.4688
White pine	.4777
Spruce	.5014
Tamarack	.4291
Ash	.4330
Aspen	.4291
Balsam poplar	.4083
Basswood	.5167
Beech	.3956
White birch	.4018
Yellow birch	.3723
Cottonwood	.4291
Elm	.4018
Hickory	.3701
Hard maple	.3617
Soft maple	.4083
Red oak	.3444
White oak	.3723
Other species	.4688

Figure 18.—Production of pulpwood from roundwood (including chips from roundwood) in the Central States by counties, in standard cords, 1989. Locations of Central States and nearby pulp mills using Central States pulpwood are shown.

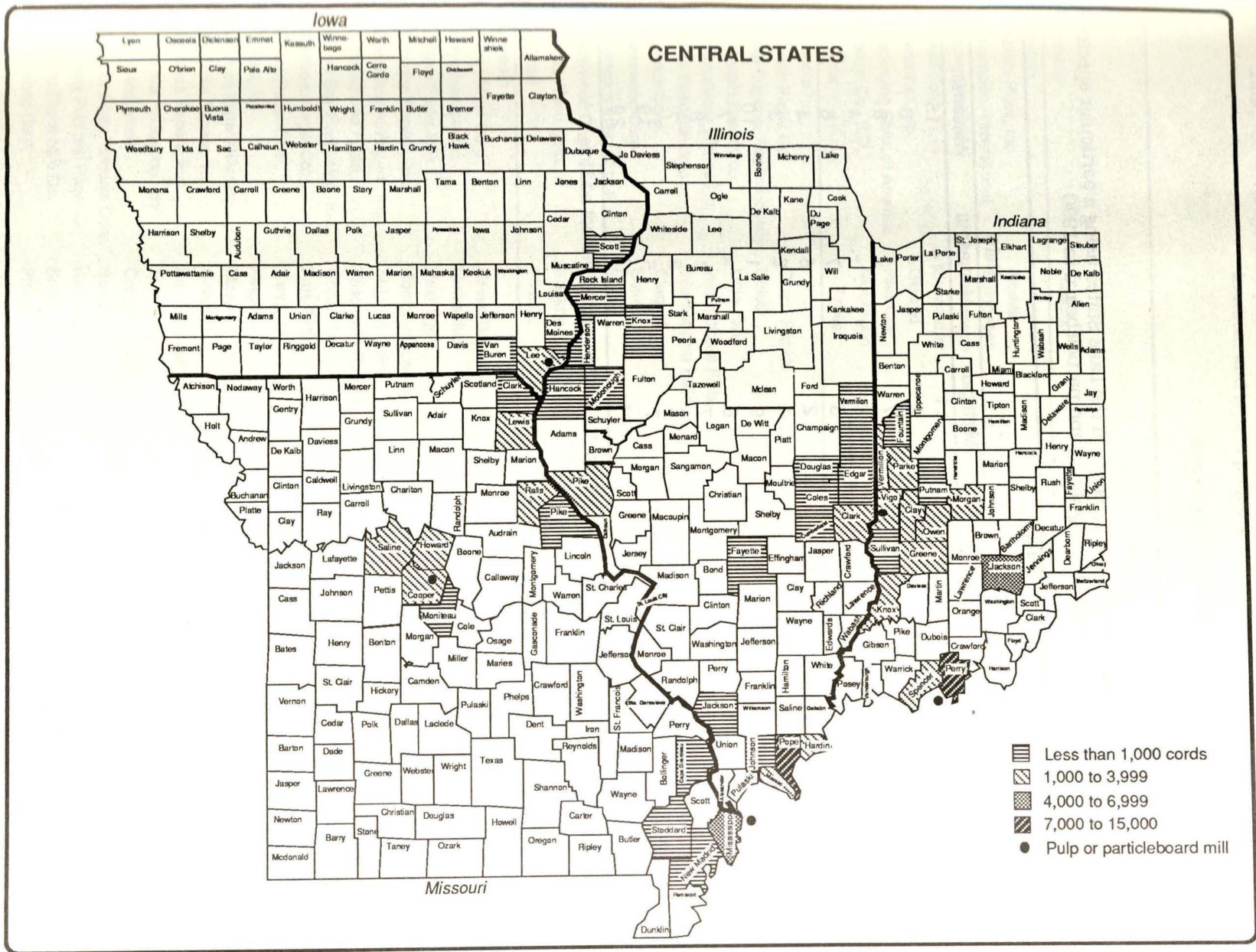


Table 2.—Numbers of industrial plants in the Lake States using a particular species or residue for pulping and particleboard in 1990

Species and kind of material	Total Lake States	State		
		Michigan	Minnesota	Wisconsin
Aspen	40	11	14	15
Balsam fir	12	2	4	6
Birch	18	7	3	8
Hemlock	6	2	—	4
Pine	18	5	7	6
Spruce	11	2	5	4
Tamarack	6	1	2	3
Maple	20	9	1	10
Oak	15	8	—	7
Other hardwoods	16	7	1	8
Softwood residue	12	2	3	7
Hardwood residue	22	7	5	10
Total plants ¹	48	11	15	22

¹ Some plants use more than one species, so numbers in column are not additive.

Table 3.—Average daily production of active woodpulp mills in the Lake States by mill, location, and type of pulp produced, 1990 ¹

(In tons per 24 hours)

Company	Location	All types	Pulping process			
			Sulfite	Kraft	Groundwood and other mechanical	Semi-chemical
Michigan						
Abitibi-Price, Inc.	Alpena	400	--	--	400	--
Champion International	Quinnesec	825	--	825	--	--
Stone Container	Ontonagon	575	--	--	--	575
Mead Corp.	Escanaba	800	--	600	200	--
Menasha Corp.	Otsego	310	--	--	--	310
Packaging Corp. of America	Filer City	600	--	--	--	600
Warren Co., S.D.	Muskegon	250	--	250	--	--
Total	7 mills	3,760	--	1,675	600	1,485
Minnesota						
Blandin Paper Co.	Grand Rapids	300	--	--	300	--
Lake Superior Paper Industry	Duluth	440	--	--	440	--
Hennepin Paper Co.	Little Falls	75	--	--	75	--
International Bldrite Inc.	International Falls	110	--	--	110	--
Boise Cascade Corp.	International Falls	400	--	400	--	--
Potlatch Corp.	Cloquet	520	--	520	--	--
Superwood Corp.	Bemidji	100	--	--	100	--
Champion International	Sartell	385	--	--	385	--
Superwood Corp.	Duluth	350	--	--	350	--
Certain-Teed Corp.	Shakopee	80	--	--	80	--
Total	10 mills	2,760	--	920	1,840	--
Wisconsin						
James River Corp.	Green Bay	160	160	--	--	--
Weyerhaeuser Co.	Rothschild	200	200	--	--	--
Badger Paper Mills	Peshtigo	120	120	--	--	--
Appleton Papers, Inc.	Combined Locks	200	--	--	200	--
Consolidated Papers, Inc.	Stevens Point	272	--	--	272	--
Consolidated Papers, Inc.	Wisconsin Rapids	553	--	--	553	--
Green Bay Packaging, Inc.	Green Bay	220	--	--	--	220
Flambeau Paper Co.	Park Falls	120	120	--	--	--
Midtec Paper Corp.	Kimberly	180	--	--	180	--
Pentair, Inc.	Niagara	210	--	--	210	--
Mosinee Paper Mills Co.	Mosinee	220	--	220	--	--
Nekoosa Papers, Inc.	Nekoosa	335	--	335	--	--
Nekoosa Papers, Inc.	Port Edwards	235	235	--	--	--
Nekoosa Packaging, Inc.	Tomahawk	1,000	--	--	--	1,000
Globe Industries	Cornell	100	--	--	100	--
Superior Fiber Products Corp.	Superior	140	--	--	140	--
Thilmany Pulp and Paper Co.	Kaukauna	420	--	420	--	--
Wausau Paper Mills Co.	Brokaw	210	210	--	--	--
Superwood Corp.	Philips	100	--	--	100	--
Total	19 mills	4,995	1,045	975	1,755	1,220
All States	36 mills	11,515	1,045	3,570	4,195	2,705

¹ Lockwood's Directory of the Paper and Allied Industries—1990.

Table 4.—Production and imports of pulpwood, Central States, 1990

(In standard cords, unpeeled)¹

Species and destination	Production by States ²					Imports			
	Illinois	Indiana	Iowa	Missouri	Regional total	Lake States	Other U.S.	Total imports	Total receipts
Softwoods									
Exported ³	8,894	--	--	21	8,915	--	--	--	--
Total	8,894	--	--	21	8,915	--	--	--	--
Soft hardwoods ⁴									
Central States ⁵	2,237	11,594	--	6,078	19,909	--	--	--	19,909
Exported ³	7,062	--	--	3,921	10,983	--	--	--	--
Total	9,299	11,594	--	9,999	30,892	--	--	--	19,909
Hard hardwoods ⁶									
Central States ⁵	5,840	11,392	4,023	2,596	23,851	--	--	--	23,851
Exported ³	13,936	14,940	--	3,412	32,288	--	--	--	--
Total	19,776	26,332	4,023	6,008	56,139	--	--	--	23,851
Total roundwood									
Central States ⁵	8,077	22,986	4,023	8,674	43,760	--	--	--	43,760
Exported ³	29,892	14,940	--	7,354	52,186	--	--	--	--
Total	37,969	37,926	4,023	16,028	95,946	--	--	--	43,760
Residue, softwoods									
Exported ³	--	266	--	3,163	3,429	--	--	--	--
Total	--	266	--	3,163	3,429	--	--	--	--
Residue, hardwoods									
Central States ⁵	24,954	51,988	10,044	10,413	97,399	--	--	--	97,399
Exported ³	12,834	99,120	--	65,374	177,328	--	2,943	2,943	--
Total	37,788	151,108	10,044	75,787	274,727	--	2,943	2,943	97,399
All wood material									
Central States ⁵	33,031	74,974	14,067	19,087	141,159	--	--	--	141,159
Exported ³	42,726	114,326	--	75,891	232,943	--	2,943	2,943	--
Total	75,757	189,300	17,067	94,978	374,102	--	2,943	2,943	141,159

¹ Factors used in converting to standard green cords (128 cu. ft. including bark and air space) were:

4,266 pounds of softwood roundwood;

4,795 pounds of soft hardwood roundwood;

5,394 pounds of hard hardwood roundwood;

4,100 pounds of softwood chips (green mill residue);

4,400 pounds of hardwood chips (green mill residue);

2,500 pounds of chips (all species, dry mill residue).

² Vertical columns of figures under box heading "Production by States" present the amount of pulpwood cut in each State.

³ Pulpwood shipped to mills outside the region.

⁴ Hardwood species with an average specific gravity of 0.50 or less.

⁵ Combined to prevent disclosure of individual mill receipts.

⁶ Hardwood species with an average specific gravity greater than 0.50.

Table 5.—Average daily production of active woodpulp mills in the Central States by mill, location, and type of pulp produced, 1990

(In tons per 24 hours) ¹

State and Company	Location	All types	Pulping process			
			Sulfite	Kraft	Groundwood and other mechanical	Semi-chemical
Illinois						
(No current operations)						
Total	0 mill	--	--	--	--	--
Indiana						
Weston Paper and Mfg. Co.	Terre Haute	300	--	--	--	300
Total	1 mill	300	--	--	--	300
Iowa						
Consolidated Packaging Corp	Fort Madison	150	--	--	--	150
Total	1 mill	150	--	--	--	150
Missouri						
Huebert Fibreboard, Inc.	Booneville	60	--	--	60	--
Total	1 mill	60	--	--	60	--
All States	3 mills	510	--	--	60	450

¹ Lockwood's Directory of the Paper and Allied Industries—1990

Table 6.—Lake States pulpwood production by State of origin and destination, 1986-1990

(In thousand standard cords, unpeeled)¹

MICHIGAN

Year	Total production	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1986	2,808	--	369	2,429	10
1987	2,747	--	313	2,420	14
1988	2,920	(2)	311	2,597	12
1989	3,112	(2)	319	2,777	16
1990	2,982	1	313	2,645	23
5-year average	2,914	(2)	325	2,574	15

MINNESOTA

Year	Total production	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1986	1,979	1,872	69	(2)	38
1987	2,079	1,967	61	--	51
1988	2,131	2,002	79	2	48
1989	2,263	2,110	116	2	34
1990	2,361	2,200	127	1	33
5-year average	2,163	2,030	90	1	41

WISCONSIN

Year	Total production	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1986	2,926	56	2,693	177	--
1987	2,869	62	2,644	161	2
1988	3,084	80	2,771	233	(2)
1989	3,161	89	2,799	272	1
1990	3,094	83	2,768	243	--
5-year average	3,027	74	2,735	217	(2)

¹ Includes mill residues used for pulp.

² Less than 500 cords.

Table 7.—Lake States pulpwood production by Forest Survey Unit and destination by State, 1990

(In thousand standard cords, unpeeled)

Unit	Total production	MICHIGAN			
		Total	Destination of pulpwood		
		Michigan	Minnesota	Wisconsin	Other
Roundwood					
Eastern Upper Peninsula	747	653	--	82	12
Western Upper Peninsula	990	767	2	212	9
Northern Lower Peninsula	935	932	--	--	3
Southern Lower Peninsula	46	46	--	--	--
Total	2,718	2,398	2	294	24
Residue	265	246	--	19	--
Total pulpwood	2,983	2,644	2	313	24

MINNESOTA					
Roundwood					
Aspen-Birch	1,015	1	910	72	32
Northern Pine	1,152	--	1,131	21	--
Central Hardwood	106	--	74	32	--
Prairie	4	--	4	--	--
Total	2,277	1	2,119	125	32
Residue	83	--	80	2	1
Total pulpwood	2,360	1	2,199	127	33

WISCONSIN					
Roundwood					
Northeast	1,075	181	9	885	--
Northwest	1,127	37	63	1,027	--
Central	595	9	--	586	--
Southwest	53	--	--	53	--
Southeast	16	--	--	16	--
Total	2,866	227	72	2,567	--
Residue	228	16	11	201	--
Total pulpwood	3,094	243	83	2,768	--

¹ Less than 500 cords.

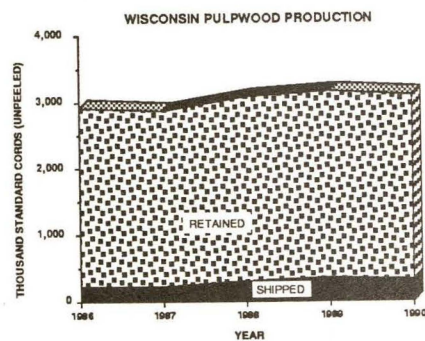
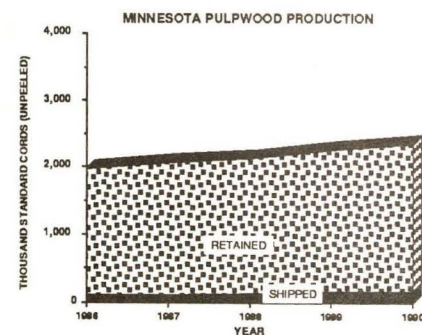
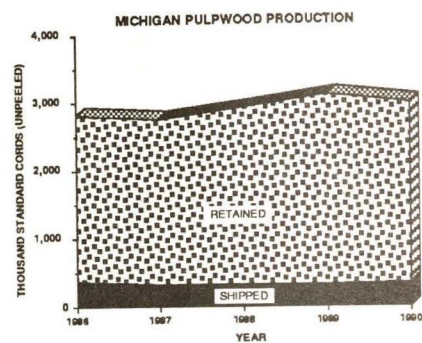


Table 8.—Lake States annual pulpwood production from roundwood by species, State, and Forest Survey Unit, 1986-1990

(In thousand standard cords, unpeeled)

MICHIGAN															
Unit	All species ¹					Pine					Spruce				
	1986	1987	1988	1989	1990	1986	1987	1988	1989	1990	1986	1987	1988	1989	1990
Eastern Upper Peninsula	681	711	758	768	747	107	95	93	53	99	50	54	53	66	29
Western Upper Peninsula	866	777	911	1,044	989	66	58	82	70	87	40	41	39	48	36
Northern Lower Peninsula	1,013	978	946	986	935	142	139	123	131	113	3	2	1	1	1
Southern Lower Peninsula	55	52	59	54	46	(2)	(2)	(2)	(2)	(2)	--	--	--	--	--
Total	2,615	2,518	2,674	2,852	2,717	315	292	298	254	299	93	97	93	115	66
MINNESOTA															
Aspen-Birch	828	969	922	986	1,014	74	64	72	66	58	74	82	114	130	137
Northern Pine	965	911	997	1,106	1,152	60	45	47	63	76	24	19	32	33	43
Central Hardwood	82	83	94	89	106	5	2	2	3	4	(2)	(2)	(2)	(2)	(2)
Prairie	1	1	4	3	4	--	--	--	(2)	(2)	--	--	--	--	--
Total	1,876	1,964	2,017	2,184	2,276	139	111	121	132	138	98	101	146	163	180
WISCONSIN															
Northeast	1,102	1,044	1,112	1,090	1,075	137	139	170	149	152	21	24	26	27	32
Northwest	1,017	977	1,078	1,139	1,127	105	80	114	120	162	9	11	15	16	15
Central	484	513	552	586	595	233	239	250	246	262	1	1	2	2	1
Southwest	17	26	32	38	53	16	23	28	25	34	(2)	(2)	(2)	(2)	(2)
Southeast	15	12	20	16	16	9	7	12	10	10	(2)	(2)	(2)	(2)	(2)
Total	2,635	2,572	2,794	2,869	2,866	500	488	574	550	620	31	36	43	45	48
Total Lake States	7,126	7,054	7,485	7,905	7,859	954	891	993	936	1,057	222	234	282	323	294

¹ Includes a small quantity of cedar not shown elsewhere in the table.² Less than 500 cords.

(Table 8 continued on next page)

(Table 8 continued)

MICHIGAN															
Unit	Balsam fir					Hemlock					Tamarack				
	1986	1987	1988	1989	1990	1986	1987	1988	1989	1990	1986	1987	1988	1989	1990
Eastern Upper Peninsula	49	57	75	88	51	24	20	20	23	31	2	2	3	4	5
Western Upper Peninsula	44	38	39	51	33	19	19	15	19	24	2	20	2	2	3
Northern Lower Peninsula	4	3	4	4	2	(2)	--	(2)	(2)	1	--	--	--	--	--
Southern Lower Peninsula	--	--	--	--	--	(2)	--	--	--	--	--	--	--	--	--
Total	97	98	118	143	86	43	39	35	42	56	4	22	5	6	8
MINNESOTA															
Aspen-Birch	51	61	102	118	117	--	--	--	--	--	13	5	9	2	2
Northern Pine	50	50	68	80	80	--	--	--	--	--	(2)	3	2	3	2
Central Hardwood	--	1	1	1	(2)	--	--	--	--	--	--	--	--	--	--
Prairie	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	101	112	171	199	197	--	--	--	--	--	13	8	11	5	4
WISCONSIN															
Northeast	36	32	39	38	37	31	40	40	36	32	1	1	1	2	4
Northwest	9	12	31	28	27	5	1	4	5	4	1	1	2	2	4
Central	1	1	1	1	1	1	1	2	2	2	(2)	(2)	1	1	1
Southwest	--	(2)	(2)	--	(2)	--	--	(2)	--	(2)	--	--	--	--	--
Southeast	(2)	--	(2)	--	(2)	(2)	--	(2)	--	(2)	--	--	--	--	--
Total	46	45	71	67	66	37	42	46	43	38	2	2	4	5	9
Total Lake States	244	255	360	409	349	80	81	81	85	94	19	32	20	16	21

² Less than 500 cords

(Table 8 continued on next page)

(Table 8 continued)

MICHIGAN															
Unit	Aspen					Birch					Other hardwoods				
	1986	1987	1988	1989	1990	1986	1987	1988	1989	1990	1986	1987	1988	1989	1990
Eastern Upper Peninsula	113	114	135	171	220	78	87	106	107	82	225	251	253	233	226
Western Upper Peninsula	252	180	293	364	369	112	106	115	120	103	313	300	316	357	333
Northern Lower Peninsula	599	593	562	553	515	30	35	38	52	43	235	206	218	245	259
Southern Lower Peninsula	15	10	19	16	12	(²)	(²)	(²)	(²)	(²)	40	42	40	38	34
Total	979	897	1,009	1,104	1,116	220	228	259	279	228	813	799	827	873	852
MINNESOTA															
Aspen-Birch	575	716	581	616	632	10	12	10	21	21	31	29	34	34	44
Northern Pine	820	784	830	909	928	(²)	1	2	2	1	11	9	16	17	22
Central Hardwood	73	77	86	81	94	(²)	(²)	1	1	1	4	3	4	4	7
Prairie	1	1	4	3	4	--	--	--	--	--	--	--	--	--	--
Total	1,469	1,578	1,501	1,609	1,658	10	13	13	24	23	46	41	54	55	73
WISCONSIN															
Northeast	474	369	418	437	409	144	145	151	146	136	258	294	267	254	272
Northwest	567	572	573	573	520	126	122	139	151	149	195	178	200	243	246
Central	162	153	176	184	151	13	19	23	35	45	73	99	97	113	134
Southwest	1	2	3	12	14	(²)	(²)	(²)	1	1	(²)	1	1	1	4
Southeast	4	1	1	2	2	(²)	1	1	(²)	(²)	2	3	6	4	3
Total	1,208	1,097	1,171	1,208	1,096	283	287	314	333	331	528	575	571	615	659
Total Lake States	3,656	3,572	3,681	3,921	3,870	513	528	586	636	582	1,387	1,415	1,452	1,543	1,584

² Less than 500 cords.

Table 9.—Michigan pulpwood production from roundwood by county and species group, 1990

(In standard cords, unpeeled)

Unit and county 1	All species	Species group										Balsam poplar
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	
E. UPPER PENINSULA												
Alger	84,764	344	4,308	4,354	6,991	1,679	506	1,197	837	712	16,569	4,878
Chippewa	88,301	428	4,988	4,632	14,281	1,916	585	2,697	374	279	32,792	5,124
Delta	224,797	1,256	16,077	7,805	23,224	6,840	1,847	11,029	1,344	1,078	66,598	11,473
Luce	34,014	293	3,659	2,502	7,548	1,427	431	1,293	300	113	6,603	1,881
Mackinac	85,201	343	3,967	2,377	3,653	1,462	465	3,207	295	393	31,271	6,381
Menominee	130,099	566	8,587	4,414	7,440	3,158	846	6,255	1,103	698	44,875	4,494
Schoolcraft	99,710	780	9,732	4,615	9,689	3,840	1,147	2,982	799	640	21,400	5,302
Total	746,886	4,010	51,318	30,699	72,826	20,322	5,827	28,660	5,052	3,913	220,108	39,533
W. UPPER PENINSULA												
Baraga	63,295	114	1,422	1,874	2,855	617	168	410	117	1,209	19,742	682
Dickinson	168,828	1,025	13,706	6,990	14,149	7,386	1,508	7,135	1,200	530	80,591	4,144
Gogebic	106,290	7	2,082	371	3,611	1,879	59	4,730	101	1,723	35,821	125
Houghton	80,30	118	1,556	1,208	1,558	1,118	173	1,358	150	1,785	16,852	1,201
Iron	162,788	140	4,767	4,595	6,926	3,870	546	17,172	508	2,107	56,540	877
Keweenaw	5,654	--	--	--	--	--	--	14	--	121	1,440	--
Marquette	252,247	734	9,258	8,439	33,495	3,638	1,221	4,741	1,004	1,522	83,007	7,616
Ontonagon	150,092	--	205	155	2,205	434	14	340	--	5,639	74,800	2,156
Total	989,524	2,138	32,996	23,632	64,799	18,942	3,689	35,900	3,080	14,636	368,793	16,801
N. LOWER PENINSULA												
Alcona	50,857	--	--	--	5,450	90	--	--	--	395	35,502	1,287
Alpena	22,433	--	--	--	177	94	--	--	--	179	18,622	591
Antrim	13,026	--	--	--	90	324	--	--	--	135	4,292	--
Arenac	7,689	--	--	--	61	36	--	--	--	10	7,020	86
Bay	168	--	--	--	--	--	--	--	--	--	168	--
Benzie	21,980	--	--	--	26	123	--	--	--	417	9,443	--
Charlevoix	1,699	--	--	--	--	23	--	--	--	28	1,063	--
Cheboygan	63,698	185	1,273	376	3,754	762	139	488	--	287	35,913	163
Clare	44,407	--	--	--	171	18	--	--	--	374	29,063	--
Crawford	59,567	9	64	2	26,439	3,155	7	15	--	60	18,362	--
Emmet	6,857	--	--	--	609	774	--	--	--	14	4,167	--
Gladwin	11,073	--	--	--	74	58	--	--	--	129	9,271	--
Grand Traverse	18,089	--	--	--	2,961	1,351	--	--	--	209	7,950	--
Iosco	11,604	--	--	14	137	51	--	8	--	207	7,081	159
Isabella	18,208	--	--	--	--	15	--	--	--	130	17,191	--
Kalkaska	33,689	1	10	--	480	5,290	1	3	--	185	15,974	--
Lake	69,247	--	--	--	6,184	318	--	--	--	752	28,059	--
Manistee	16,704	--	--	--	528	231	--	--	--	403	6,998	--
Mason	34,418	--	--	--	177	--	--	--	--	221	20,787	--
Mecosta	25,642	--	--	--	--	206	--	--	--	391	21,287	--
Midland	14,821	--	--	--	--	--	--	--	--	493	9,675	104
Missaukee	48,618	--	--	--	713	1,563	--	--	--	1,009	27,933	--
Montmorency	40,252	--	--	--	5,898	133	--	--	--	337	24,106	440
Newaygo	30,361	--	--	--	--	--	--	--	--	261	13,789	--
Oceana	15,051	--	--	--	--	--	--	--	--	97	7,238	--
Ogemaw	24,558	--	--	--	5,110	189	--	--	--	121	14,387	121
Osceola	41,820	--	--	--	621	169	--	--	--	928	26,899	--
Oscoda	46,657	--	--	--	11,317	2,212	--	--	--	137	19,426	411
Otsego	32,797	18	120	106	5,542	1,590	13	160	--	135	12,797	--
Presque Isle	40,270	79	543	1,142	2,698	323	60	800	--	611	22,516	750
Roscommon	31,881	--	--	--	9,196	534	--	--	--	29	18,390	40
Wexford	36,367	--	--	--	1,107	3,749	--	--	--	289	19,155	--
Total	934,508	292	2,010	1,640	89,520	23,381	220	1,474	--	8,973	514,522	4,152
S. LOWER PENINSULA												
Allegan	7,563	--	--	--	--	--	--	--	--	8	858	--
Barry	1,375	--	--	--	--	--	--	--	--	6	705	--
Branch	535	--	--	--	--	--	--	--	--	--	--	--
Calhoun	40	--	--	--	--	--	--	--	--	--	40	--
Cass	2,041	--	--	--	--	--	--	--	--	--	--	--
Gratiot	130	--	--	--	--	--	--	--	--	--	130	--
Kalamazoo	205	--	--	--	--	--	--	--	--	--	--	--
Kent	1,508	--	--	--	--	--	--	--	--	13	1,029	--
Montcalm	7,481	--	--	--	--	46	--	--	--	59	3,387	--
Muskegon	18,417	--	--	--	--	63	--	--	--	174	3,963	--
Ottawa	3,191	--	--	--	--	--	--	--	--	28	1,518	--
St. Joseph	1,491	--	--	--	--	--	--	--	--	--	--	--
Van Buren	1,957	--	--	--	--	--	--	--	--	--	--	--
Total	45,934	--	--	--	--	109	--	--	--	288	11,630	--
State total	2,716,852	6,440	86,324	55,971	227,145	62,754	9,736	66,034	8,132	27,810	1,115,053	60,486

¹ Includes only those counties that supplied pulpwood in 1990.

(Table 9 continued on next page)

(Table 9 continued)

(Table 9 continued)		MICHIGAN										
		Species group										
Unit and county ¹	Basswood	Beech	White birch	Yellow birch	Cotton- wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
E. UPPER PENINSULA												
Alger	2,164	2,074	5,128	3,925	-	1,652	-	15,581	9,369	1,584	-	912
Chippewa	888	952	3,698	1,149	-	602	-	5,555	6,668	467	-	226
Delta	3,008	4,739	20,298	5,416	-	3,271	-	22,248	14,616	1,673	29	928
Luce	345	585	1,483	618	-	50	-	2,536	1,680	176	-	491
Mackinac	1,229	1,580	8,706	1,857	-	1,046	-	8,252	7,787	592	-	338
Menominee	1,636	1,886	17,882	2,962	-	1,404	-	12,306	7,659	1,238	62	628
Schoolcraft	1,885	2,223	5,506	3,411	-	1,640	-	13,671	8,473	1,255	-	720
Total	11,155	14,039	62,701	19,338	-	9,665	-	80,149	56,252	6,985	91	4,243
W. UPPER PENINSULA												
Baraga	1,535	954	5,510	3,086	-	541	-	13,755	5,977	1,354	-	1,373
Dickinson	1,506	1,740	3,765	2,737	-	1,292	-	10,987	6,836	1,017	4	580
Gogebic	3,486	667	4,069	5,803	-	917	-	23,948	11,608	3,065	6	2,212
Houghton	2,313	1,428	7,620	4,936	-	926	-	21,728	9,938	2,258	38	2,068
Iron	2,184	1,129	16,635	5,125	-	885	-	22,421	11,396	2,698	239	2,028
Keweenaw	91	140	545	411	-	30	-	1,743	730	158	-	231
Marquette	4,361	3,357	23,028	8,029	-	2,906	-	31,800	18,525	3490	7	2,069
Ontonagon	7,289	186	7,264	4,379	-	1,783	-	30,051	9,239	3,171	4	778
Total	22,765	9,601	68,436	34,506	-	9,280	-	156,433	74,249	17,211	298	11,339
N. LOWER PENINSULA												
Alcona	76	56	2,995	-	-	-	-	146	2,101	2,495	264	-
Alpena	32	25	1,338	-	-	-	-	62	914	360	39	-
Antrim	378	226	1,800	-	-	-	-	1,273	4,404	104	-	-
Arenac	2	-	213	-	-	-	-	7	254	-	-	-
Bay	-	-	-	-	-	-	-	-	-	-	-	-
Benzie	1,042	890	454	199	-	-	-	2,971	4,600	1,161	420	234
Charlevoix	104	19	187	13	-	-	-	116	142	6	-	-
Cheboygan	712	200	6,094	4	-	-	-	2,494	10,421	427	3	3
Clare	416	700	874	104	-	-	-	2,459	5,198	3,418	909	703
Crawford	192	90	1,300	-	-	-	-	814	3,898	4,590	448	122
Emmet	50	13	326	-	-	-	-	176	728	-	-	-
Gladwin	-	-	317	3	-	-	-	-	814	249	119	39
Grand Traverse	208	209	156	105	-	-	-	487	2,816	1,109	320	208
Iosco	48	14	2,032	4	-	-	-	47	1,069	493	91	149
Isabella	-	11	88	-	-	-	-	16	354	241	139	23
Kalkaska	600	280	872	177	-	-	-	1,774	4,827	1,513	1,181	521
Lake	1,458	1,076	1,083	336	-	-	-	3,433	8,924	8,397	6,231	2,996
Manistee	938	697	302	1	-	-	-	1,385	1,205	1,944	1,720	352
Mason	527	531	976	10	-	-	-	1,202	3,329	3,276	2,755	627
Macosta	-	8	409	34	-	-	-	316	1,157	745	1,013	76
Midland	-	108	653	14	104	-	-	322	2,270	675	393	10
Missaukee	907	566	1,427	19	-	-	-	2,366	5,804	4,353	1,709	249
Montmorency	111	63	3,253	-	-	-	-	306	2,702	2,682	221	-
Newaygo	-	112	226	49	-	-	-	250	1,703	6,752	6,078	1,141
Oceana	123	38	33	22	-	-	-	179	2,227	2,466	2,410	218
Ogemaw	23	15	1,331	3	-	-	-	234	1,260	1,397	357	10
Osceola	469	743	1,427	184	-	-	-	2,434	3,593	2,707	1,334	312
Oscoda	211	58	2,695	-	-	-	-	636	3,157	5,970	427	-
Otsego	463	129	3,213	3	-	-	-	1,727	6,764	14	1	2
Presque Isle	207	117	4,431	-	-	-	-	628	4,561	726	78	-
Roscommon	2	1	307	1	-	-	-	8	846	1,433	988	106
Wexford	1,146	638	936	139	-	-	-	1,195	4,256	2,445	861	451
Total	10,445	7,633	41,748	1,424	104	-	-	29,463	96,298	62,148	30,509	8,552
S. LOWER PENINSULA												
Allegan	-	2	-	-	-	-	-	1	1,905	2,299	2,485	5
Barry	-	3	-	1	-	-	-	17	20	304	307	12
Branch	-	-	-	-	-	-	-	-	194	164	177	-
Calhoun	-	-	-	-	-	-	-	-	-	-	-	-
Cass	-	-	-	-	-	-	-	-	741	625	675	-
Gratiot	-	-	-	-	-	-	-	-	-	-	-	-
Kalamazoo	-	-	-	-	-	-	-	-	-	-	-	-
Kent	-	2	-	-	-	-	-	-	-	205	-	-
Montcalm	-	11	16	-	-	-	-	17	46	234	129	38
Muskegon	-	157	17	13	-	-	-	9	1,414	1,225	1,294	20
Ottawa	-	43	-	6	-	-	-	32	1,181	6,069	5,838	910
St. Joseph	-	-	-	-	-	-	-	20	120	703	732	21
Van Buren	-	-	-	-	-	-	-	-	542	456	493	-
Total	-	218	33	20	-	-	-	96	6,873	12,883	12,778	1,006
State total	44,365	31,491	172,918	55,288	104	18,945	-	266,141	233,672	99,227	43,676	25,140
¹ Includes only those counties that supplied data used in 1999.												

¹ Includes only those counties that supplied pulpwood in 1990.

Table 10.—Minnesota pulpwood production from roundwood by county and species group, 1990

(In standard cords, unpeeled)

Unit and county ¹	All species	Species group										
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
ASPEN-BIRCH												
Carlton	52,627	—	12,593	—	1,228	1,015	20	1,890	21	—	25,048	3,085
Cook	52,070	—	7,787	—	104	34	—	19,345	—	—	24,776	24
Koochiching	284,109	1,325	29,646	—	7,261	1,270	310	57,353	1,749	21	173,873	11,277
Lake	116,124	—	10,964	—	7,315	520	36	17,248	224	—	68,271	930
St. Louis	509,560	2,498	55,773	—	28,857	6,768	2,964	40,921	810	21	339,823	19,858
Total	1,014,490	3,823	116,763	—	44,765	9,607	3,330	136,757	2,804	42	631,791	35,174
NORTHERN PINE												
Aitkin	96,100	—	5,257	—	322	201	4	1,399	24	—	77,813	7,453
Becker	53,861	—	1,136	—	295	90	4	127	—	—	52,042	167
Beltrami	163,816	—	12,408	—	8,390	1,007	191	7,659	1,259	—	132,501	401
Cass	171,042	—	7,346	—	7,257	1,303	225	1,516	37	—	152,449	909
Clearwater	76,462	—	2,114	—	537	168	5	2,251	55	—	71,165	167
Crow Wing	58,337	—	683	—	3,177	726	—	186	12	—	53,270	283
Hubbard	49,081	—	470	—	4,995	702	29	310	—	—	41,062	1,200
Itasca	380,044	554	48,785	—	5,922	1,612	531	19,412	139	63	295,722	2,974
Lake of the Woods	51,640	—	2,118	—	18,875	316	196	9,080	7	—	20,779	269
Mahnomen	7,448	—	—	—	—	—	—	—	—	—	7,448	—
Roseau	26,073	—	64	—	15,337	41	—	635	57	—	9,774	165
Wadena	18,229	—	134	—	3,321	273	5	—	—	—	14,386	110
Total	1,152,133	554	80,515	—	68,428	6,439	1,190	42,575	1,590	63	928,411	14,098
CENTRAL HARDWOOD												
Kanabec	3,187	—	—	—	—	—	—	—	—	—	3,187	—
Mille Lacs	32,956	—	—	—	65	16	—	—	—	—	32,841	34
Morrison	5,016	—	—	—	65	16	—	—	—	—	4,928	7
Pine	62,409	—	61	—	816	737	16	309	—	—	52,223	3,646
Sherburne	1,899	—	—	—	39	1,821	24	15	—	—	—	—
Todd	797	—	—	—	65	16	—	—	—	—	709	7
Total	106,264	—	61	—	1,050	2,606	40	324	—	—	93,888	3,694
PRAIRIE												
Lincoln	15	—	—	—	—	15	—	—	—	—	—	—
Pennington	469	—	—	—	—	—	—	—	—	—	469	—
Polk	2,135	—	—	—	—	—	—	—	—	—	2,135	—
Red Lake	1,406	—	—	—	—	—	—	—	—	—	1,406	—
Total	3,034	—	—	—	—	15	—	—	—	—	4,010	—
State total	2,184,503	4,377	197,339	—	114,243	18,667	4,560	179,656	4,394	105	1,658,100	52,966

¹ Includes only those counties that supplied pulpwood in 1990.

(Table 10 continued on next page)

(Table 10 continued)

Table 10 continued)

Unit and county ¹	MINNESOTA											
	Species group											
	Basswood	Beech	White birch	Yellow birch	Cotton- wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
ASPEN-BIRCH												
Carlton	-	-	5,202	-	-	-	-	-	2,525	-	-	-
Cook	-	-	-	-	-	-	-	-	-	-	-	-
Koochiching	-	-	24	-	-	-	-	-	-	-	-	-
Lake	-	-	10,596	-	-	-	-	-	20	-	-	-
St. Louis	-	-	5,016	-	-	-	-	-	6,251	-	-	-
Total	-	-	20,838	-	-	-	-	-	8,796	-	-	-
NORTHERN PINE												
Aitkin	-	-	13	-	-	-	-	-	3,614	-	-	-
Becker	-	-	-	-	-	-	-	-	-	-	-	-
Beltrami	-	-	-	-	-	-	-	-	-	-	-	-
Cass	-	-	-	-	-	-	-	-	-	-	-	-
Clearwater	-	-	-	-	-	-	-	-	-	-	-	-
Crow Wing	-	-	-	-	-	-	-	-	-	-	-	-
Hubbard	-	-	313	-	-	-	-	-	-	-	-	-
Itasca	-	-	659	-	-	-	-	-	3,671	-	-	-
Lake of the Woods	-	-	-	-	-	-	-	-	-	-	-	-
Mahnomen	-	-	-	-	-	-	-	-	-	-	-	-
Roseau	-	-	-	-	-	-	-	-	-	-	-	-
Wadena	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	985	-	-	-	-	-	7,285	-	-	-
CENTRAL HARDWOOD												
Kanabec	-	-	-	-	-	-	-	-	-	-	-	-
Mille Lacs	-	-	-	-	-	-	-	-	-	-	-	-
Morrison	-	-	-	-	-	-	-	-	-	-	-	-
Pine	116	-	918	-	-	-	-	-	3,567	-	-	-
Sherburne	-	-	-	-	-	-	-	-	-	-	-	-
Todd	-	-	-	-	-	-	-	-	-	-	-	-
Total	116	-	918	-	-	-	-	-	3,567	-	-	-
PRAIRIE												
Lincoln	-	-	-	-	-	-	-	-	-	-	-	-
Pennington	-	-	-	-	-	-	-	-	-	-	-	-
Polk	-	-	-	-	-	-	-	-	-	-	-	-
Red Lake	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	-
State total	116	-	22,741	-	-	-	-	-	19,648	-	-	-

¹ Includes only those counties that supplied pulpwood in 1990.

Table 11.—Wisconsin pulpwood production from roundwood by county and species group, 1990

(In standard cords, unpeeled)

Unit and county ¹	All species	Species group										Balsam poplar
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	
NORTHEAST												
Florence	76,229	28	4,762	2,554	4,865	3,054	350	2,075	160	1,075	34,981	62
Forest	121,653	-	6,264	1,604	5,505	5,799	217	5,580	694	5,278	36,986	-
Langlade	125,758	-	2,531	864	4,290	5,059	67	994	168	4,326	59,248	-
Lincoln	92,660	-	3,127	540	2,721	2,643	380	1,334	582	3,067	46,700	-
Marinette	187,565	13	5,561	926	24,287	13,093	643	3,390	1,172	2,082	67,246	64
Menominee	52,964	1	293	21,499	1,007	3,697	2,718	34	-	990	11,835	5
Oconto	60,021	-	622	146	6,132	8,569	347	26	14	457	25,264	-
Oneida	179,917	-	8,592	2,622	14,866	14,703	1,288	5,760	934	5,388	66,690	-
Shawano	31,654	-	19	843	648	6,171	223	49	-	834	6,412	-
Vilas	146,328	-	5,450	914	10,069	7,411	1,443	12,512	101	2,920	53,765	-
Total	1,074,749	42	37,221	32,512	74,390	70,199	7,676	31,754	3,825	26,417	409,127	131
NORTHWEST												
Ashland	87,132	-	3,779	325	8,181	3,198	116	4,766	668	3,761	21,111	-
Barron	28,988	-	-	-	348	811	20	315	22	259	23,013	-
Bayfield	170,629	-	2,606	-	16,338	9,652	596	133	-	2,425	96,745	1,431
Burnett	67,670	-	-	-	21,463	6,923	51	-	-	231	34,579	-
Douglas	132,103	-	8,852	-	35,588	8,577	272	1,014	41	330	52,338	1,122
Iron	88,401	-	779	221	181	255	64	358	-	1480	54,444	78
Polk	9,796	-	-	-	136	277	79	-	-	98	8,641	-
Price	134,487	-	4,996	996	2,837	4,548	228	3,636	860	5,483	52,274	-
Rusk	59,566	-	139	89	1,490	1,970	28	500	485	2,218	28,986	-
Sawyer	164,336	-	2,235	615	3,767	5,145	770	2,037	1,023	6,652	72,963	-
Taylor	94,466	-	3,487	1,588	3,809	2,827	71	2,609	822	4,473	30,654	-
Washburn	89,152	-	209	-	14,713	6,379	347	156	14	1,443	43,798	-
Total	1,126,726	-	27,082	3,834	108,851	50,562	2,642	15,524	3,935	28,853	519,546	2,631
CENTRAL												
Adams	71,554	-	408	-	22,809	26,382	1,558	21	112	604	11,987	-
Chippewa	44,746	-	138	137	2,339	2,407	14	193	264	1,730	21,018	-
Clark	71,972	-	-	-	3,336	4,680	351	26	-	3,397	29,648	-
Eau Claire	23,349	-	-	-	1,425	2,940	136	-	22	550	6,609	-
Jackson	76,149	-	-	-	30,665	10,684	866	141	26	859	16,319	-
Juneau	43,562	-	-	-	23,065	10,434	565	-	-	524	1,066	-
Marathon	76,084	-	557	1,223	2,471	5,291	492	326	15	2,909	31,555	-
Marquette	20,404	-	24	-	3,802	10,791	1,059	40	36	473	271	-
Monroe	23,225	-	-	-	7,997	7,501	745	197	11	541	1,744	-
Portage	37,037	-	58	180	4,656	9,603	1,336	43	64	1,257	7,975	-
Waupaca	20,060	-	26	60	1,643	8,465	1,112	-	11	280	4,246	-
Waushara	37,460	-	-	-	3,950	24,762	3,730	27	131	192	1,261	-
Wood	49,601	-	-	13	6,708	9,443	1,243	221	54	1,374	17,061	-
Total	595,203	-	1,211	1,613	114,866	133,383	13,207	1,235	746	14,690	150,760	-
SOUTHWEST												
Buffalo	716	-	-	-	10	631	38	-	-	1	26	-
Crawford	9,192	-	-	-	31	21	-	-	-	255	6,586	-
Dunn	13,875	-	-	11	3,336	4,929	120	-	-	115	4,294	-
Grant	556	-	-	-	14	542	-	-	-	-	-	-
Iowa	2,174	-	-	-	27	1,866	257	-	-	1	-	-
La Crosse	2,024	-	-	-	494	1,216	70	39	-	15	41	-
La Fayette	6	-	-	6	-	-	-	-	-	-	-	-
Pepin	676	-	-	-	336	234	-	-	-	5	48	-
Pierce	879	-	10	-	318	262	10	133	-	5	95	-
Richland	1,003	-	-	-	380	623	-	-	-	-	-	-
St. Croix	8,884	-	-	-	285	4,980	97	-	-	41	3,348	-
Sauk	7,226	-	13	14	935	5,498	601	-	-	1	115	-
Trempealeau	6,206	-	-	-	398	4,426	720	-	-	69	-	-
Total	53,417	-	23	31	6,564	25,228	1,913	172	-	508	14,553	-
SOUTHEAST												
Brown	459	-	-	-	-	294	-	-	-	-	75	-
Calumet	232	-	-	-	-	15	-	-	-	22	-	-
Columbia	6,301	-	-	-	1,097	4,322	373	13	-	31	-	-
Door	108	-	-	11	53	-	-	-	-	-	44	-
Fond Du Lac	446	-	-	-	-	226	-	-	-	8	-	-
Green	216	-	-	-	-	216	-	-	-	-	-	-
Green Lake	478	-	-	-	36	399	-	-	-	-	-	-
Jefferson	64	-	-	-	-	13	-	-	-	2	-	-
Kewaunee	14	-	-	-	-	14	-	-	-	-	-	-
Mantowoc	813	-	18	11	-	91	92	-	-	60	-	-
Milwaukee	25	-	-	-	10	15	-	-	-	-	-	-
Outagamie	4,040	-	-	-	-	274	92	-	-	133	2,200	-
Ozaukee	36	-	-	-	14	22	-	-	-	-	-	-
Racine	11	-	-	-	-	11	-	-	-	-	-	-
Sheboygan	761	-	-	-	-	761	-	-	-	-	-	-
Waukesha	1,601	-	-	-	-	986	615	-	-	-	-	-
Winnebago	185	-	-	-	-	13	-	-	-	7	-	-
Total	15,790	-	18	22	1,210	7,672	1,172	13	-	360	2,319	-
State total	2,865,885	42	65,555	38,012	305,881	287,044	26,610	48,698	8,506	66,225	1,096,305	2,762

¹ Includes only those counties that supplied pulpwood in 1990.

(Table 11 continued on next page.)

(Table 11 continued)

(Table 11 continued)		WISCONSIN										
		Species group										
Unit and county ¹	Basswood	Beech	White birch	Yellow birch	Cotton- wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
NORTHEAST												
Florence	814	200	9,621	899	-	159	-	5,579	3,726	770	249	246
Forest	1,370	252	12,774	2,082	-	3,003	-	17,452	12,913	2,247	1,236	397
Langlade	1,871	144	12,586	1,858	-	1,018	-	16,605	10,141	2,411	771	806
Lincoln	2,529	51	7,409	1,068	-	1,297	-	10,562	6,443	1,468	290	449
Marinette	2,073	946	19,837	5,177	-	684	-	23,224	11,960	2,737	234	2,216
Menominee	82	124	1,300	409	-	511	-	4,124	3,763	399	115	58
Oconto	763	73	6,549	1,207	-	205	-	5,375	3,119	714	42	397
Oneida	3,992	43	19,961	1,560	-	680	-	17,589	11,005	2,714	1,057	473
Shawano	388	164	3,757	1,076	-	170	-	5,928	3,794	676	100	402
Vilas	2,462	80	25,907	1,410	-	642	-	11,490	7,023	1,721	573	435
Total	16,344	2,077	119,701	16,746	-	8,369	-	117,928	73,887	15,857	4,667	5,879
NORTHWEST												
Ashland	929	82	12,697	1,680	-	1,128	-	13,289	8,447	1,708	899	368
Barron	8	-	2,507	81	-	4	-	938	480	123	23	36
Bayfield	990	33	21,024	860	-	287	-	8,720	7,301	979	310	199
Burnett	18	-	2,502	62	-	4	-	816	835	134	22	30
Douglas	254	4	14,309	165	-	20	-	1,420	7,467	229	32	69
Iron	1,894	71	8,515	1,641	-	397	-	9,487	6,580	1,351	35	570
Polk	-	3	126	14	-	84	-	200	136	2	-	-
Price	3,730	110	18,426	1,679	-	917	-	18,324	11,203	2,751	888	601
Rusk	1,249	2	7,354	651	-	50	2	8,097	4,443	1,292	206	315
Sawyer	1,836	12	25,781	1,879	-	747	2	21,248	12,684	3,313	1,027	600
Taylor	1,430	161	10,780	1,548	-	5,020	-	12,654	10,258	1,456	656	163
Washburn	176	-	14,160	300	-	91	-	4,008	2,491	604	77	186
Total	12,514	478	138,181	10,560	-	8,749	4	99,201	72,325	13,942	4,175	3,137
CENTRAL												
Adams	181	5	1,228	165	-	13	-	2,106	1,523	2,085	289	78
Chippewa	505	10	4,717	447	-	159	-	6,102	3,245	875	289	157
Clark	442	99	8,503	834	-	1,042	-	8,123	8,801	1,504	836	350
Eau Claire	68	22	6,873	164	-	356	-	1,793	1,930	240	56	165
Jackson	116	13	3,583	242	-	189	-	2,654	5,308	3,375	832	277
Juneau	57	1	1,423	115	-	96	-	1,370	1,348	2,924	484	90
Marathon	716	242	5,269	1,469	-	3,843	-	9,733	8,374	921	339	339
Marquette	54	-	1,138	109	-	25	-	1,271	863	268	172	8
Monroe	36	6	1,312	84	-	69	-	1,018	1,118	603	179	64
Portage	163	84	2,061	494	-	1,226	-	3,654	3,128	604	250	201
Waupaca	20	124	181	260	-	7	-	1,975	1,282	159	35	174
Waushara	14	82	299	179	-	6	-	1,130	646	635	304	112
Wood	163	57	3,115	386	-	247	-	3,946	3,949	978	553	90
Total	2,535	745	39,702	4,948	-	7,278	-	44,875	41,515	15,171	4,618	2,105
SOUTHWEST												
Buffalo	-	-	-	1	-	3	-	3	3	-	-	-
Crawford	-	26	-	128	-	766	-	664	690	25	-	-
Dunn	4	1	393	27	-	5	-	364	195	56	10	15
Grant	-	-	5	-	-	-	-	-	-	-	-	-
Iowa	-	1	-	3	-	-	-	12	4	1	-	2
La Crosse	1	3	30	8	-	1	-	59	33	6	4	4
La Fayette	-	-	-	-	-	-	-	-	-	-	-	-
Pepin	1	-	13	1	-	-	-	14	20	2	2	-
Pierce	1	-	14	1	-	-	-	16	10	2	2	-
Richland	-	-	-	-	-	-	-	-	-	-	-	-
St. Croix	-	-	26	-	-	-	-	-	-	-	-	-
Sauk	-	1	-	2	-	-	-	73	34	-	-	-
Trempealeau	8	-	176	18	-	4	-	24	20	1	-	1
Total	15	32	652	189	-	779	-	196	135	32	23	1
SOUTHEAST												
Brown	-	-	-	-	-	-	-	-	90	-	-	-
Calumet	-	58	-	-	-	-	-	54	83	-	-	-
Columbia	4	1	155	9	-	2	-	203	63	15	10	3
Door	-	-	-	-	-	-	-	-	-	-	-	-
Fond Du Lac	-	2	59	5	-	14	-	32	78	8	3	11
Green	-	-	-	-	-	-	-	-	-	-	-	-
Green Lake	-	-	-	-	-	-	-	-	-	-	-	-
Jefferson	-	3	-	6	-	-	-	3	4	-	-	-
Kewaunee	-	-	-	-	-	-	-	25	9	2	-	4
Manitowoc	-	123	-	-	-	-	-	-	-	-	-	-
Milwaukee	-	-	-	-	-	-	-	61	117	240	-	-
Outagamie	-	15	-	28	-	-	-	-	-	-	-	-
Ozaukee	-	-	-	-	-	-	-	441	747	62	27	21
Racine	-	-	-	-	-	-	-	-	-	-	-	-
Sheboygan	-	-	-	-	-	-	-	-	-	-	-	-
Waukesha	-	-	-	-	-	-	-	-	-	-	-	-
Winnebago	-	10	-	19	-	-	-	86	31	5	-	14
Total	4	212	214	67	-	16	-	905	1,222	332	40	53
State total	31,412	3,544	298,450	32,510	-	25,191	4	264,334	190,093	45,427	13,541	11,197
¹ Includes only those counties that supplied pulpwood in 1999.												

¹ Includes only those counties that supplied pulpwood in 1990.

Table 12.—Central States pulpwood production by State and destination, 1986-1990

(In thousand standard cords, unpeeled)

Year	Illinois			Indiana			Iowa			Missouri		
	Total	Destination		Total	Destination		Total	Destination		Total	Destination	
		Central	Other		Central	Other		Central	Other		Central	Other
		States	States		States	States		States	States		States	States
1986	69	30	39	153	64	89	21	17	4	87	26	61
1987	91	35	56	178	76	102	23	23	--	111	29	82
1988	92	38	55	179	73	106	26	26	--	101	24	77
1989	92	32	60	170	68	102	25	25	--	109	18	91
1990	76	33	43	189	75	114	14	14	--	95	19	76

Table 13.—Trends in receipts of roundwood and residue as pulpwood,
Central States, 1986-1990¹

(In thousand standard cords, unpeeled)

Type of material and area	1986	1987	1988	1989	1990
Roundwood					
Indiana, Iowa, Missouri	57	67	62	53	44
Total	57	67	62	53	44
Residue					
Indiana, Iowa, Missouri	81	98	99	91	97
Total	81	98	99	91	97
All material	138	165	161	144	141

¹ Illinois does not have any wood pulp mills and therefore is not included here.

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38 p.

Lake States pulpwood production dropped to 8.4 million cords in 1990. Central States pulpwood production dropped by 6 percent—from 396 thousand cords in 1989 to 374 thousand cords in 1990. Pulpwood production is shown by county and species group for Michigan, Minnesota, Wisconsin, Iowa, Missouri, Illinois, and Indiana.

KEY WORDS: Roundwood, whole-tree chips, residue, Minnesota, Michigan, Wisconsin, Illinois, Iowa, Indiana, Missouri.

Our job at the North Central Forest Experiment Station is discovering and creating new knowledge and technology in the field of natural resources and conveying this information to the people who can use it. As a new generation of forests emerges in our region, managers are confronted with two unique challenges: (1) Dealing with the great diversity in composition, quality, and ownership of the forests, and (2) Reconciling the conflicting demands of the people who use them. Helping the forest manager meet these challenges while protecting the environment is what research at North Central is all about.

